OCT 18 1915

THE HEATING AND VENTILATING MAGAZINE

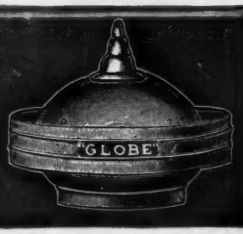
Vol. XII. No. 10.
$1.00 a year. 10 cents a copy

NEW YORK, OCTOBER, 1915.

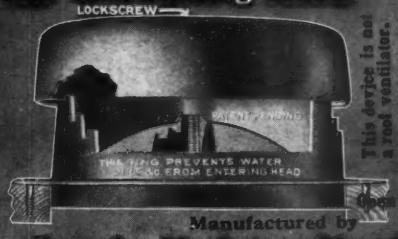
Publication Office:
1123 Broadway, New York

GURNEY HEATERS
FOR HEATING ANY DESCRIPTION OF BUILDING BY STEAM OR HOT WATER
GURNEY HEATER MANUFACTURING CO.
NEW YORK OFFICE 12 E. 42ND ST. 188-200 FRANKLIN ST. BOSTON.

THE "GLOBE" VENTILATOR
COPPER AND GALVANIZED IRON
SIMPLE, SYMMETRICAL, STORM PROOF, SUCCESSFUL
Model and Blue Print on Application
GLOBE VENTILATOR CO., TROY, N. Y.



Knowles Mushroom Diffuser and Air Controlling Head (Improved Notch Style) ADJUSTABLE



This device is not a roof ventilator.

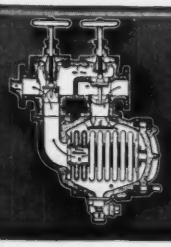
Placed under seats in all auditoriums. A perfect Air Controlling Head and Diffuser, assuring *uniform distribution.*

Manufactured by
Knowles Mushroom Ventilator Co.
Successor to Geo. E. Knowles 9 Church St., New York

AIR DUCT TEMPERATURES
Should be continuously recorded by means of
TRADE MARK
BRISTOL'S
REG. U.S. PAT. OFFICE.
Recording Thermometers

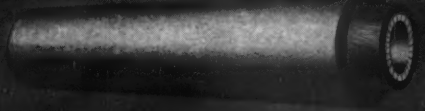
with these automatic recorders in rooms heated, and the chart records compared each day to guide operation of heating and ventilating systems.

THE BRISTOL CO., Waterbury, Conn
141 Liberty Street New York
1670 Frick Bldg. Annex Pittsburgh, Pa.



ROSS FEED-WATER FILTERS
Will Keep Oil Out of Your Boiler
Regulating Valves for Water, Steam, Air
Ross Valve Mfg. Co. Troy, N. Y.
Ask for List of Users

MICHIGAN STANDARD TIN-LINED WOOD COVERING
FOR INSULATING UNDERGROUND STEAM PIPES

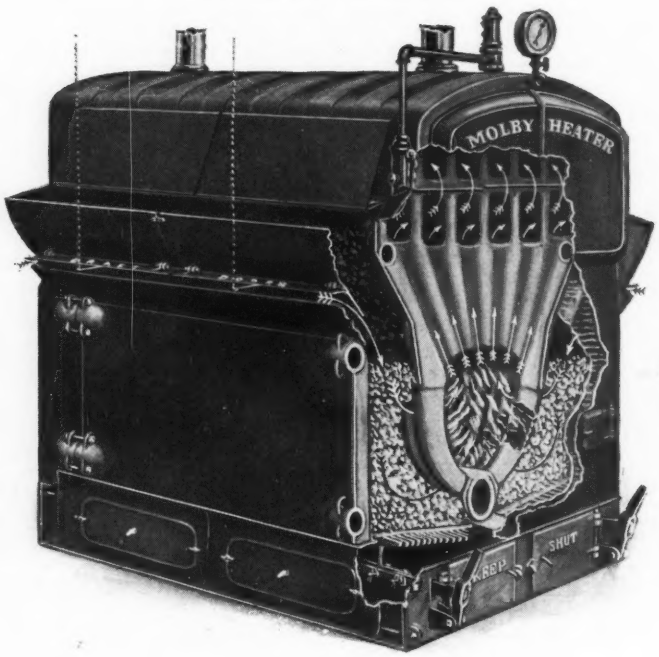


SIMPLE DURABLE EFFICIENT
THE MICHIGAN PIPE CO., Bay City, Mich.

Entered as second-class matter at the Post-Office in New York, N. Y. Copyright, 1915, by Heating and Ventilating Magazine Co.

MOLBY DOWN DRAFT BOILER

SMOKELESS



Built under Surrell patents, embodying a true principle of combustion:

Exhaustive tests prove that we burn bituminous coal without smoke.

A magazine gravity feed carrying supply of fuel for twelve or more hours in extreme weather.

A gas producing and gas burning boiler.

Burns pea coal or larger sizes of Anthracite.

Burns your gas, your coke, your cinders.

Saves 40% to 50% in operating cost.

Write for interesting catalogue.

MOLBY BOILER CO., Inc.

39-41 Cortlandt Street, New York

THE HEATING AND VENTILATING MAGAZINE

1123 BROADWAY NEW YORK OCTOBER, 1915

A Combined Heating and Sprinkler System for a Factory Building

PLANT OF WHEELOCK, LOVEJOY & CO., CAMBRIDGE, MASS.

By CHARLES L. HUBBARD.

The heating system for the new building of Wheelock, Lovejoy & Co., in Cambridge, Mass., is of especial interest from the fact that the heating and sprinkler systems are combined, thus reducing the radiating surface to about 30% of that required, if the usual system of independent heating were employed.

The building is approximately 170 ft. x 180 ft. in size, by one story in height, and is devoted to the storage of steel stock and the cutting and tempering of the same. While much larger buildings have been equipped with this system of heating, the present case is well adapted to purposes of illustration, owing to its simplicity.

Piping plans showing the layout for the combined heat and sprinkler system and the auxiliary heating system are shown in Figs. 3 and 4, respectively. Out of a total of 5,000 sq. ft. of radiation required, 3,800 sq. ft. are made up of the sprinkler mains and laterals, which would have to be furnished in any case. The auxiliary surface consists of twelve cast-iron radiators in the office section and a circulation along one side of the main work room, as indicated in Fig. 4.

HOT WATER HEAT USED.

The medium of heat transmission is hot water, which is heated in a 40 H. P. vertical tubular boiler and circulated by a centrifugal pump having a normal capacity of 150 gal. per minute at a speed of 700 R. P. M. The pump is driven by a 2½ H. P. belted motor, as shown in Fig. 5, and operates under a head of approximately 20 ft.

HOW SYSTEMS ARE CHANGED.

A sprinkler system is changed to a

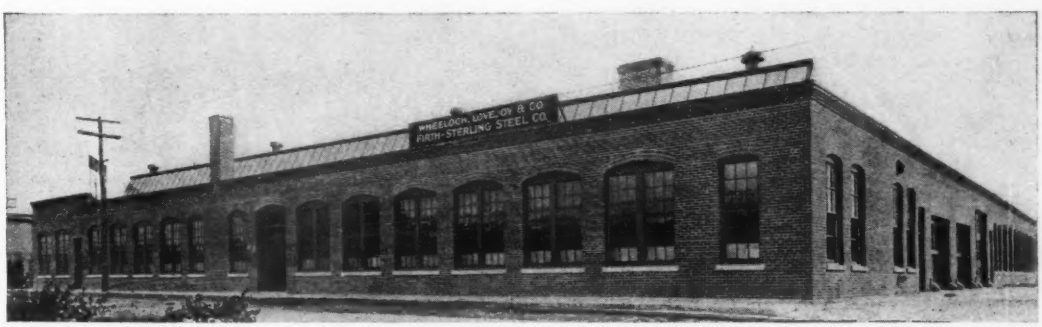


FIG. 1.—PLANT OF WHEELOCK, LOVEJOY & CO., CAMBRIDGE, MASS.

FIG. 2.—INTERIOR OF WHEELOCK, LOVEJOY & CO.'S PLANT, SHOWING METHOD OF MAKING SPRINKLER CONNECTION IN HEATING MAINS.

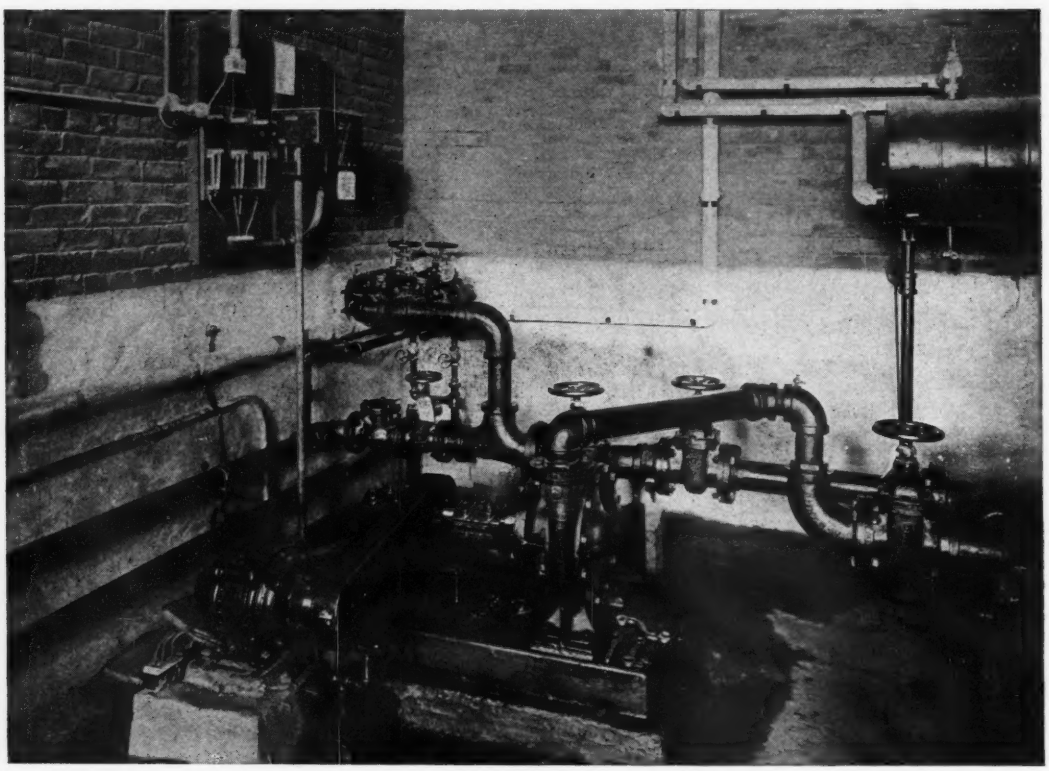


FIG. 5.—CIRCULATING PUMP FOR HOT WATER HEATING AND SPRINKLER SYSTEM IN PLANT OF WHEELOCK, LOVEJOY & CO.

heating system, without affecting its original purpose, by simply tapipng the ends of the laterals and bringing back return connections to the suction of a circulating pump which discharges through a heater into the sprinkler supply mains, inside the alarm valve.

In buildings several stories in height, sufficient circulation has been obtained by gravity, without the use of a pump. In general, however, forced circulation is not affected in any way. The only details requiring change are shallow loops or traps in the sprinkler-head connections to prevent circulation and to keep the hot water from the fusible pieces, and provision for expansion. The method of making the sprinkler connection is shown in Fig. 2, and is very simple in construction. Expansion is provided for by the use of a closed tank, with an air cushion, or a by-pass may

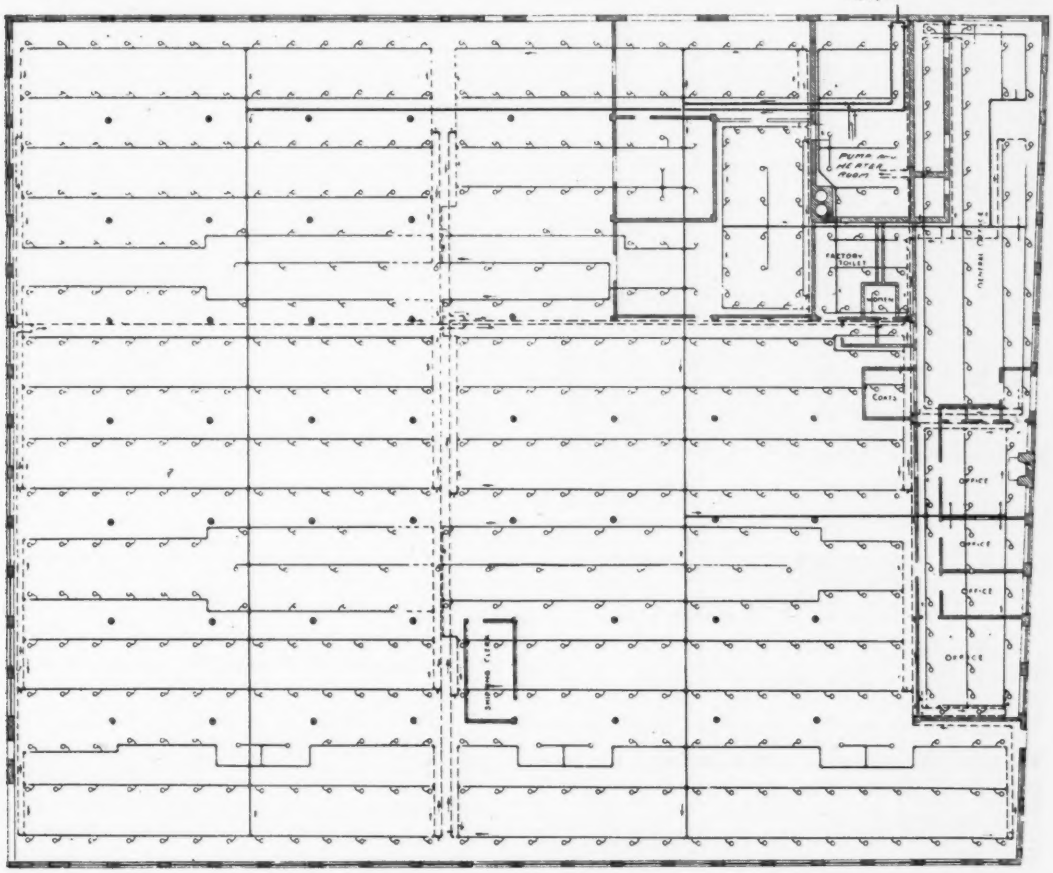


FIG. 3.—PIPING LAYOUT FOR HOT WATER HEATING AND SPRINKLER SYSTEM, PLANT OF WHEELOCK, LOVEJOY & CO.

is usually preferable, for hot water heating large buildings, regardless of whether the combined or independent system is employed.

Circulating hot water through a sprinkler system has no effect upon its efficiency as a protection against fire. The pump and heater are in a by-pass connection, the regular pressure is carried at all times, and the supply of cold water in the sprinklers, in case of fire, be carried around the alarm valve in the sprinkler system, this pipe containing a check valve opening outward and having a small hole drilled in the seat. When the volume of water in the system increases, due to expansion, the surplus passes into the city mains, or other source of supply, through the check valve. As the water cools, contraction takes place slowly, and the system is again filled through the small hole in the check valve seat.

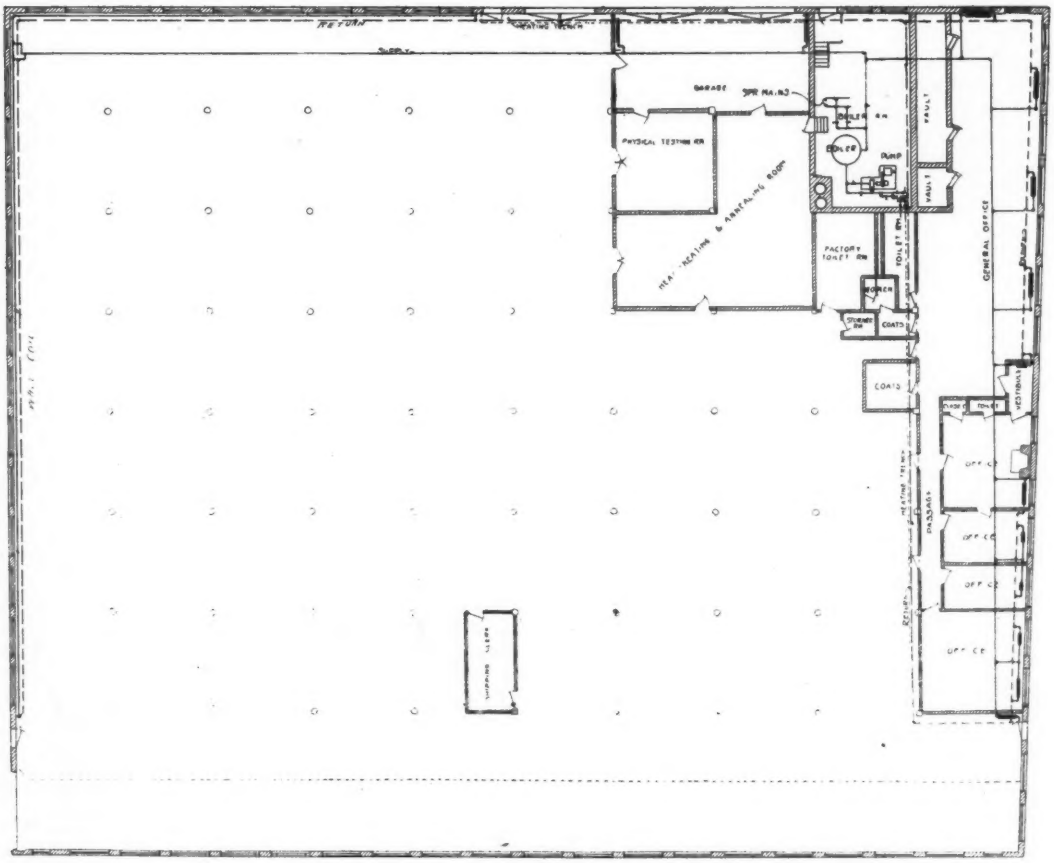


FIG. 4.—AUXILIARY HEATING SYSTEM FOR PLANT OF WHEELOCK, LOVEJOY & CO.

DESCRIPTION OF PLANS.

Referring to Fig. 3, the sprinkler system proper is shown in full lines, the returns by dotted lines, and the sprinkler heads as circles, while the direction of flow is indicated by arrows. The supply from the street main enters where shown, and then branches, two sections of the building being supplied through independent lines. Circulating connections from the pump and heater join the supply mains where marked and the returns are brought back as indicated.

The arrangement of pump, heater and connections are shown in Fig. 4, which represents teh auxiliary heating system The connections at the pump and heater are so valved that the main and auxiliary systems may be operated independently or together, as required, and the pumps may be by-passed for night warming by gravity if desired.

FIGURING A COMBINATION SYSTEM.

In making the computations for a system of this kind no changes are required from those regularly used in heating and sprinkler work as commonly installed.

In general, the sprinkler piping will supply from 60 to 70% of the needed radiation, thus greatly reducing the amount of surface in the form of coils and radiators, and also reducing the size of the mains and branches leading to the auxiliary surface.

In many buildings, or departments, the sprinkler surface will be sufficient for all of the heat required, while in others it will need to be supplemented more or less by auxiliary surface for use in the coldest weather. In some cases, where the desired increase is small, the sprinkler pipes may be increased in size sufficiently to make up the deficiency.

Water temperatures up to 250° F. may be carried without producing a rise at the sprinkler head of more than 25° above the temperature of the room, and temperatures of 70° to 80° in the pipes

will prevent freezing in the heads when the room temperature falls to 10° or 15° above zero.

This system is controlled by the Combined Heat and Sprinkler Co. of Boston, and the plant above described was installed by the Rockwood Sprinkler Co. of the same city.

Smoke Abatement in House Heating Boilers

By Martin A. Rooney, M.E.,
Smoke Inspector, Nashville, Tenn.

Practically all of the large cities of this country now have stringent ordinances directed against the emission of dense smoke from all classes of public buildings, including apartment houses, schools, etc., in which the commonly called house heating boiler is used.

By house heating boiler is meant usually the low pressure steel firebox, or the cast-iron sectional firebox boiler, and it has been amply demonstrated that these types are probably the greatest contributors to the volumes of smoke which menace life and property in our large cities.

When soft coal is burned in these furnaces (designed primarily for hard coal) all the laws of perfect combustion are outraged for

1. The rate of combustion, and, therefore, the temperature of the furnace is low.

2. The space provided for combustion is insufficient and no provision is made for mixing the volatile gases, and,

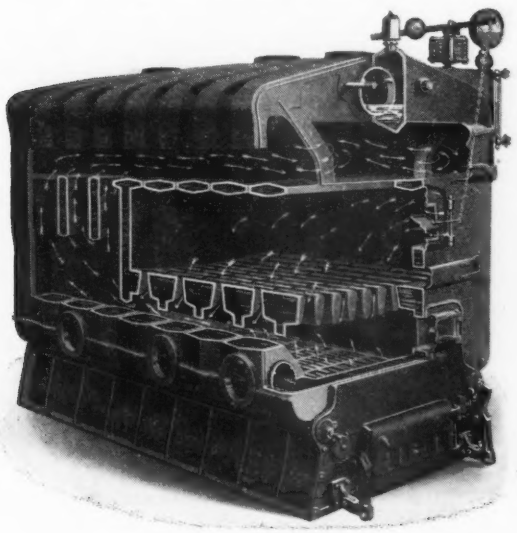


FIG. 1.—IDEAL SMOKELESS BOILER.
(American Radiator Co., Chicago, Ill.)

3. The volatile gases are brought into contact with the cool surfaces of the boiler before their combustion is completed.

To overcome these difficulties, numerous smokeless boilers have appeared on the market in the last few years and their number is being constantly augmented.

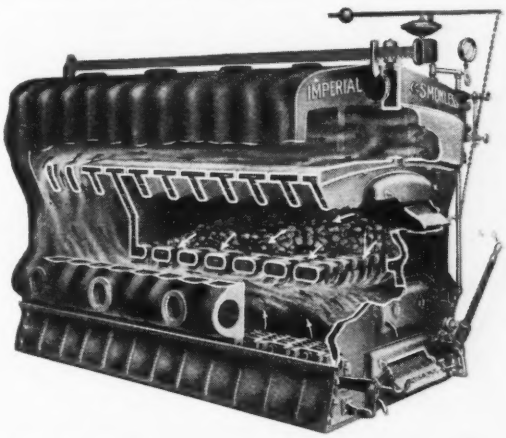


FIG. 2.—IMPERIAL SMOKELESS BOILER.
(Utica Heater Co., Utica, N. Y.)

All of these employ the down-draft principle in which the air supplied to the furnace and the combustible gases are drawn down through a bed of hot coals on the upper grate and over coals on a lower grate which have fallen through from the upper grate and are thus completely burned without smoke. The upper grate, called the water grate, has water circulating through it to prevent burning.

The various designs differ in the kind and arrangement of the upper grate and in other mechanical details.

CLASSES OF DOWN DRAFT BOILERS.

They naturally fall into the following classes:

A. Cast-Iron Boilers.
(1) With Cast-Iron Upper Grates.
(2) With Steel Upper Grates.

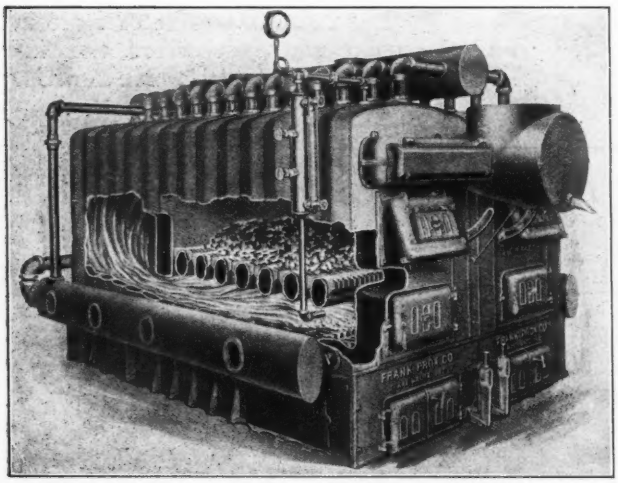


FIG. 3.—DUPLEX ECONOMIC HEAVY-DUTY SMOKELESS DOWN-DRAFT BOILER.
(Frank Prox Co., Terre Haute, Ind.)

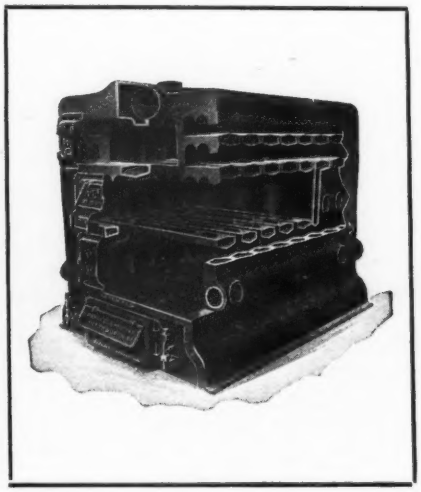


FIG. 4.—PEERLESS HEATER.
(Peerless Heater Co., Pittsburgh, Pa.)

(3) With No Upper Grates.

B. Steel Boilers.

The following brief description of some of the principal makes will serve to illustrate their points of difference. Figs. 1, 2, 3 and 4 represent the makes using cast-iron water grates. The manufacturers of this type claim the following advantages for grates cast integral with the sections:

1. That being cast integral, assembling the upper grate requires no additional labor.

2. That being of the same material the grates and sections expand equally.

3. That cast-iron does not corrode as rapidly as steel.

4. That larger areas are offered for water circulation than where comparatively small steel pipes are used.

The boilers shown in Figs. 5 and 6 have wrought-iron water grates. The advantages claimed for this arrangement are:

1. That with inclined grates there is less likelihood of scale deposit than with flat grates and,

2. That in case of the failure of a section of the grate exposed to the severe treatment of the fire and firing tools, repairs can be made without sending to the factory for parts.

A boiler without any upper grate at all is shown in Fig. 7. Its designers claim for it absence of all grate troubles, vertical circulation of water and large combustion space.

All steel boilers, of course, have steel water grates and those shown in Figs. 8 and 9 will serve as typical illustrations. The boiler shown in Fig. 9 has bent grate tubes and a deflection or mixing arch at

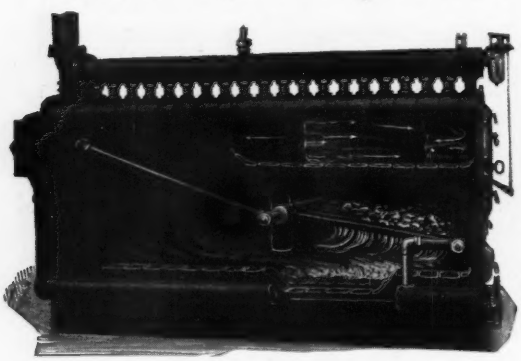


FIG. 5.—ROYAL DOWN-DRAFT SMOKELESS BOILER.
(Hart & Crouse Co., Utica, N. Y.)

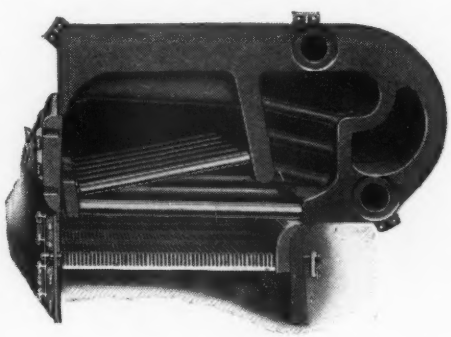


FIG. 6.—BERNHARD SMOKELESS BOILER.
(Kanawha Mine Car Co., Charleston-Kanawha, W. Va.)

the rear of the lower grate, features peculiar to this particular make.

OPERATION OF DOWN-DRAFT BOILERS.

Down-draft furnaces must burn their fuel more briskly and thicker fires must be maintained in them than in ordinary

FIX. X.—MOLBY SMOKELESS BOILER.
(Molby Boiler Co., Inc., New York.)

furnaces to obtain best results. This means that the always important question of draft must be given very careful consideration in installing down-draft furnaces. The stack sizes given in manufacturers' catalogues are, in many cases, too small. The thought in the mind of the manufacturer would seem to be that in competitive bidding the boiler requiring the lowest stack will be the cheapest, so that it is generally necessary to increase the size of the stack given in the manufacturers' catalogues to insure satisfactory results.

RULES FOR STACKS AND BREECHINGS.

The following rules for stacks and breechings have been used in several hundred cases with highly satisfactory results.

1. The top of the stack must be higher than any structure within 50 ft. of the stack.

2. The following table gives sizes of stacks:

Capacity of Boilers, Sq. Ft.	Size of Stack.
500	9 in. x 9 in. x 40 ft.
500 to 1,000	12 in. x 12 in. x 45 ft.
1,000 to 1,500	12 in. x 12 in. x 50 ft.
1,500 to 2,500	16 in. x 16 in. x 60 ft.
2,500 to 3,000	20 in. x 20 in. x 60 ft.
3,000 to 3,500	20 in. x 20 in. x 65 ft.
3,500 to 3,800	20 in. x 20 in. x 70 ft.
3,800 to 4,200	20 in. x 20 in. x 75 ft.
4,200 to 6,500	24 in. x 24 in. x 75 ft.
6,500 to 8,750	24 in. x 24 in. x 80 ft.
8,750 to 10,000	28 in. x 28 in. x 80 ft.
10,000 to 10,500	32 in. x 32 in. x 80 ft.
10,500 to 13,000	32 in. x 32 in. x 90 ft.
13,000 to 14,000	36 in. x 36 in. x 90 ft.
14,000 to 14,500	36 in. x 36 in. x 95 ft.
14,500 to 15,000	36 in. x 36 in. x 100 ft.

The above stack sizes are for boilers which are set not over 10 ft. from the stack, counting from center of stack to back of boiler, and allow for only one right angle turn in the smoke connection.

FIG. 8.—KEWANEE SMOKELESS BOILER.
(Kewanee Boiler Co., Kenwanee, Ill.)

For each additional right angle turn, add 10 ft. to the height of the stack.

3. All breechings should be as large as the smoke outlet of the boiler and should be free from dips, bends or restrictions.

After fire is started keep upper firebox *full*. When steam is needed stoke upper fire by pushing point of slicing bar along the surface of the upper grate, slicing coke through to lower grate. Don't

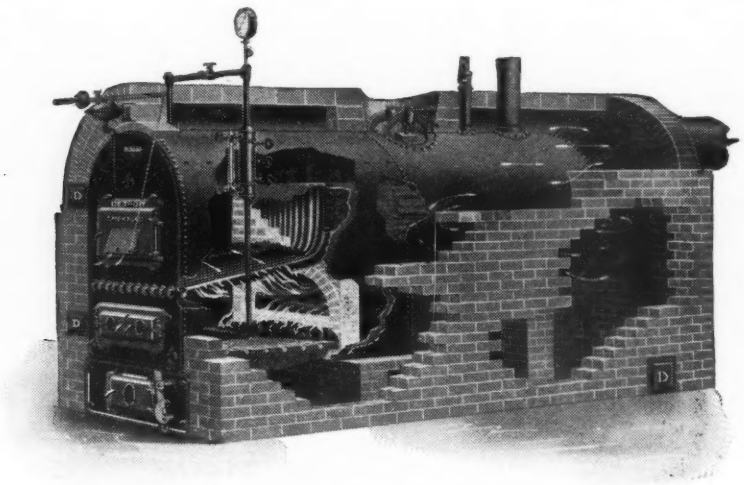


FIG. 9.—DETROIT SMOKELESS BOILER.
(John Brennan & Company, Detroit, Mich.)

Down-draft boilers can be operated just as easily as straight-draft boilers if the following simple directions are observed.

Starting fire. Place coal broken to not larger than fist size on upper grate, place wood on top of this and paper, waste or shavings on top of the wood. Put wood and shavings on lower grate. Light kindling on both grates. Leave upper door open.

poke surface of upper fire. **Don't stoke** immediately after adding fresh coal to upper fire.

Never put any fuel on lower grate.
Keep fire on lower grate clean.
Bank on upper grate.
Keep boiler flues clean.

With these boilers properly installed and operated it is easily possible to eliminate from 95 per cent. to 97 per cent. of smoke.

Definite Recommendations for Improving the Status of the Heating Engineer

A serious and carefully-planned effort to improve the status of the heating engineer is disclosed in the final report of a committee appointed by the New York Chapter of The American Society of Heating and Ventilating Engineers, consisting of Perry West, Newark, N. J., chairman; Frank K. Chew, New York; and J. I. Lyle, New York.

The committee lists its recommendations under eight headings and then proceeds to give practical suggestions as to ways and means for carrying out the recommendations.

MEMBERSHIP STANDARDS AND THE LICENSING OF ENGINEERS.

Under this heading the opinion is expressed that society membership should be a thing to be more sought after, also that a movement should be started for the legal licensing of engineers under the direction of State boards consisting of engineers selected by the national society, with, perhaps, a national board for deciding appeals from local boards.

THE STATUS OF THE ENGINEER IN HIS OWN FIELD.

In this connection the committee finds that the services of the engineer are too seldom employed and the field he works in is not properly cultivated, as is shown in the unproductiveness and size of the fees secured. It is also the belief that in a great many cases engineers could be employed to better advantage by the owner direct, as are other professional men. This system would give the engineer more authority for deciding engineering questions, such as is accorded other professional men in the decision of matters pertaining to their work. There is no working agreement between engineers, architects, contractors and manufacturers whereby each of these branches might be confined to its own particular field with better economic result to all.

Recommendations for the correction of these conditions are: 1. That a large portion of the activities of the society and of its business office be diverted from so many narrow and purely technical matters, and be put to work on the policy and business of engineering. Also that some plan be worked out whereby the engineers can co-operate with this movement in their every-day business life. 2. That a survey be made and action started toward more general, direct employment of engineers. 3. That a survey be made and action started on a working agreement between engineers, architects, contractors and manufacturers.

There is a great volume of heating and ventilating engineering, states the report, that is not being done by heating and ventilating engineers. To correct this economic defect it is urgently necessary that after qualifying by study, the heating and ventilating engineer take up the equally important business side of his work. He must ignore the moss-covered notion that his services should be sought. He must see to it that the value of his services is understood and that they are presented with the same frequency and dignified persistency with which the mere mechanical factors in the equipment are offered, explained, pushed, specified, sold and put into actual use.

The sale of engineering services needs to be given a positive impetus. Engineers are employed for an uterly inadequate proportion of the available work in their field.

During 1914, the cost of building operations in the United States amounted to $700,000,000, of which $70,000,000 might be considered the cost of heating and ventilating apparatus and the percentage of this sum which a reasonable fee would bring (say 5%), has not as yet been discovered by your committee as having reached our field. It might be considered that of this sum $750,000 came to heating and ventilating engineers, leaving $2,750,000 to represent the loss to the profession. Why? Because the field is not cultivated.

Some of the work not being done by engineers is being done by architects, principally under what we believe to be a false impression, that it can be so handled to the best interests of the work

as a whole. Some by the manufacturers, principally under what we believe to be a false impression, that it is a good and economic business proposition for themselves and the owner. Some is being passed over, principally under what we believe to be a false impression, that it is not worth doing.

Of the work being done by architects, there is no question but that some of this is being done well and especially is this true where regular engineers are employed on the architects' staff. The fact remains, however, that the guiding genius of an architectural office is not often so constituted by nature that he can look with an impartial eye upon two branches of work so different as architecture and engineering. Self-preservation compels the architectural viewpoint to subordinate the plain points of utility in engineering to the finer points of beauty and arrangement of the building. The result is that the engineering vitals often suffer and have their usefulness curtailed or destroyed; and in a great many cases without the architect's appreciating the gravity of the results.

The committee expresses its belief that the conditions might be improved in many cases by employing a consulting engineer direct and allowing him to be free to act in conjunction with the architect for the best interest of his client.

Of the engineering work being done by manufacturers, some of this is no doubt legitimate and proper for the promotion of new and special devices and systems, and in the furnishing of data upon which manufacturers are sometimes better posted than engineers. A great deal of complaint is heard against engineers for not being willing to spend the time and trouble to investigate new apparatus, and for not allowing free and open competition. It is argued by some manufacturers that it is necessary that they draw plans and specifications in order to get their share of the business. It is also argued that engineers are sometimes prone to undertake work for which they are not competent, and for which they lack the necessary experience. That they are further prone in a great many instances to spurn any data or consultation from the manufacturers. Under such conditions the manufacturer sometimes argues that it is a matter of self-defence for him to draw plans and specifications. The committee feels that in a great many cases the engineer is in the wrong and should as speedily as possible put himself in the right. Where these conditions do not exist, however, the system of manufacturers' drawing plans and specifications is wrong, both from an ethical and an economical standpoint.

In the first place, the manufacturer is generally forced to draw plans and specifications for no other compensation than what can be added to the cost of the work. This introduces the greatest temptation to use special apparatus that no one else can furnish, whether the same is suitable for the purpose or not. He is also forced, in order to include his own apparatus, to lay out the entire plan, including piping, electric and transmission systems, with which his engineering staff is naturally not so familiar as with his own apparatus and its immediate connections. In other words, the greater part of the layout is handled as a side issue and is not so completely handled as it would be by a regular engineer making such matters his whole business. He is also generally thrown into competition with other contractors, who are drawing their own plans and specifications, and as a result there are a number of such, all costing their respective concerns almost as much as one good set would cost a regular engineer. All of these costs must be borne sooner or later by the consumer.

In the opinion of the committee, a thorough understanding and a square deal by all parties concerned under this arrangement would work toward its immediate abatement and the final elimination of these conditions.

The Government, and a great many of the municipal departments throughout the country are maintaining either separate or co-ordinate engineering and architectural departments, and the State commissions and other similar bodies are requiring that architects in competition shall employ engineers satisfactory to the commission. It is evident that in such

cases the value of the proper handling of the engineering work is being appreciated. It is also noted that among the contractors there are quite a few now who are refusing to bid upon engineering plans and specifications which are not directly in charge of an engineer. This movement is not prompted by any personal or political motives, but is born of a spirit of self-preservation of the financial and engineering reputation of such concerns, against the making good of unforeseen troubles and the changing of work in place, where details are not properly worked out, and other evil effects of unsatisfactory engineering.

As to what is being done toward the elimination of the drawing of plans and specifications by manufacturers, some agitation has been carried on by this society, and the manufacturers themselves have had the matter up for serious consideration since 1910. As a result, a great many of the manufacturers have discontinued the practice, and the majority of the rest, we believe, are willing to do so as soon as they can see that it is to their advantage.

ENGINEERING FEES.

Under this heading the principal need mentioned is the standardization of fees. The following schedule is submitted and its adoption by the heating engineers' society recommended. The committee also recommends that the work started by the joint committee of The American Society of Heating and Ventilating Engineers and the American Institute of Architects be reopened for the purpose of showing the architects the wisdom and propriety of adopting the heating engineers' schedule, along with others:

	Cost.	Fee.
Residence heating jobs below	$1,000	$50.00 10%
Repairs and alterations, New work	$5,000 or less	10%
New work	over $5,000	6%

A point is made of the fact that a great deal of engineering work is being done for less compensation that will provide for its being done propertly. A great many engineers appear to be sacrificing their own reputations, the high standards of the profession and the interest of the work as a whole, to commercialism and their own immediate interest; in other words, there seems to be a tendency to strive for large business at a small fee, and to turn out work which will not do credit to the profession.

An attempt to formulate some schedule of fees disclose the face that in 1900 and 1901 there was a conference between committees representing our society and the American Institute of Architects that resulted in an agreement that the owner should pay for such engineering service as the architect required. It remained for the society to formulate a schedule of fees for engineering services, and to reach some agreement regarding same with the architects, but as far as can be discovered this was never done.

We would call your attention to the following provisions which now exist in Section 3 of the American Institute of Architects' Principles of Professional Practice:

"ON SUPERINTENDENCE AND EXPERT SERVICE."

"On all work except the simplest, it is to the interest of the owner to employ a superintendent or clerk of the works. *In many engineering problems and in certain specialized esthetic problems, it is to his interest to have the services of special experts and the architect should so inform him. The experience and special knowledge of the architect make it to the advantage of the owner that these persons, although paid by the owner, should be selected by the architect under whose direction they are to work.*"

The committee considers these provisions indefinite and subject to improper use and interpretation. As such they form one of the weak points in what is otherwise a very rigid set of safeguards which the architects have chosen for regulating their professional ethics.

The architects could be shown that it would not only be to our advantage, but to theirs as well, to amend this section so as to include a mimimum schedule of fees for engineers, which would eliminate inferior engineering and its reflection upon our profession and theirs.

As the matter now stands, the architect in many cases collects the whole fee and pays the engineer out of same. With this arrangement the architect who would not break the rules of his profession by cutting his own fee may accomplish the same end by cutting the engineer's fee with impunity. This means that the architect who uses and pays for good engineering service, and by so doing is serving both his profession and ours and the public honestly, is at an unfair disadvantage with the architect who will cut the fees for the engineering.

The most important ethical point for the society to cover in the matter of fees is that in reference to residences, in which the service of the engineer is valuable to the last degree. For such work the engineer is so seldom employed that charges cannot be reliably given. Some engineers hold that the minimum should be $50.00; others say 10 to 15% and they claim to do some work at this rate. Others say not less than 6%. Others claim that for factory, school, church and public buildings, the work be divided into direct radiation plants and blower plants. Some office costs which have come to our attention run from 3½ to 4%, including inspection.

The above figures are for average size jobs and will vary some, but are considered a fair average and sufficient to show that practically all of the engineering which is being done below 5% is either being done at a loss, or is not productive of work which will probably be satisfactory to clients or creditable to the profession.

We have nothing now for the man who wants to obey the rules of law and order to conform to, nor for any engineer to point to as the recognized value of his services. Accordingly we have worked out a schedule of minimum charges.

A sliding scale schedule has been selected for three reasons: First, because other professional men have found it necessary and proper; second, because the office costs do not vary directly with the cost of the work; and third, because engineers will naturally scale their prices down as the size of the job increases, rules or no rules.

THE EFFICIENCY OF ENGINEERING.

It is stated in this connection that a great deal of engineering is being done poorly and so as to prove uneconomical simply to save time and cheapen the cost of engineering. This, it is said, is at the expense of false economy to clients and is a detriment to the profession. In the committee's opinion, the remedy for this lies in putting engineering on a better business footing and bringing the public to realize more fully that it is a paying investment.

Indications are also found tending to show that engineers are not turning out the best work that is in them and are not drawing the line closely enough between good work and short cut methods. As an illustration, the greatest number of piping, duct and transmission systems are designated from average tables, without going to the trouble to work out figures for particular cases.

Such individual handling of particular cases would often result in substantial savings from lower cost and better operation as a return for a comparatively small extra engineering fee. Such matters must be explained to the owners and architects, however, and there is apparently a reluctance on the part of engineers in using such means in promoting the advancement of the profession.

RESPONSIBILITIES OF THE ENGINEER.

The accepted arrangement of affairs today, according to the report, undoubtedly places unfair responsibilities upon the engineer. A movement should be started to rectify this condition and to prevent any tendencies toward further unfairness in this particular.

There also seems to be a tendency on the part of engineers to assume more responsibility, and to allow more of the burden of proof to be thrust upon them than is true of other professions. Owners and architects are also demanding that engineers guarantee and bond the proper working of their plants. Also a few engineers who are siding with this view. At the same time the architects and other professional men are not guaranteeing the results of their services, but are simply striving for the best and allowing the clients to take the risks. There is nothing in the ordinary engi-

neering fee to cover more than the barest compensation for services rendered, and surely nothing at all to cover any insurance of the risk, which is naturally attached to every business venture.

If such an extra fee is charged and understood the conditions are, of course, different, but it seems that this favoring of the engineers' guaranteeing their work is simply placing upon them an unfair handicap not borne by any other professions.

In this same connection a tendency is noted on the part of engineers to allow architects and others to shift the whole responsibility for the fitting of the engineering equipment into place (with the building and other items), on to the engineer's shoulders. The engineer is expected, not only to furnish all data as to sizes and requirements of his apparatus (all of which he should furnish, of course), but is sometimes required to follow up and check architectural plans and see that these requirements are met. Furthermore he is expected to check the architectural plans against all interference between his work and that of others. After this he is required to follow up on the job and see that the architect's plans and specifications are followed out, as far as his work is involved, and that nothing is installed to interfere with the engineering work.

This involves looking after a great volume of work upon which no fee is ever figured for the engineer. . He is also expected to be perfectly familiar with the building and all other kinds of plans, whereas others on the job are most generally very ready to disclaim any knowledge of the first meaning of an engineering plan.

Furthermore, too many engineers are apt to allow their contractors to be burdened with unfair responsibilities and burdens of proof. Such as the changing of work in place, where the fault lies with someone else, and the sole proving of their claims in this connection, whereas, some of the burden should rest with the other contractors involved. The unfair treatment of a contractor in this way tends to increase the cost of the next job and to embitter the contractor against engineers.

Under this heading of the shifting of responsibility, there is also noted the tendency of engineers to shift a part of their own responsibilities, such as supervision and details, to others, so as to cheapen their services; but, of course, this is at a greater cost to the job.

THE SEPARATION OF CONTRACTS.

The committee endorses the movement for the separation of contracts, "broadly speaking and on public work in particular." It believes that a great deal of harm is resulting from the practice of letting the engineering contracts as a part of general contracts, if the general contractor has neither financial nor moral responsibilities. In a number of States there is a law against this on public work.

The master fitters and plumbers are working in the interest of such laws in a number of States. In other localities engineering contractors are handling the situation by refusing to bid to general contractors of the kind mentioned. The resolution passed at the last meeting of the American Institute of Architects in New Orleans is quoted in full, as well as the following resolution passed by the National Electrical Contractors' Association in July, 1914:

"Resolved, that the National Electrical Contractors' Association of the United States, in convention assembled, concurs in the resolution adopted by the American Institute of Architects last December, at New Orleans, covering the segregation of plumbing, heating and electrical equipment, from building contracts; and that a copy of this resolution be sent to the Secretary of the American Institute of Architects."

The proper handling of such work involves the maintenance of departments; they are not as capable of properly supporting as are the engineers, who are regularly engaged in this particular work. They are also naturally lacking in the proper viewpoints which are very essential to the best interests of any undertaking.

This does not mean, of course, that all work so handled is suffering, but it seems to be pretty well proven, that the system is objectionable and that abuses are being practiced to such an extent as to warrant the serious consideration by

all parties concerned, of changing the system, especially on all public work.

EXAMPLES OF SOME OF THE ABUSES.

The following might be cited as examples of some of the abuses, which are working to the detriment of the engineer and sub-contractor.

We have all realized for some time, that the irresponsible general contractor, in a great many cases, does most all of his business on the sub-contractor's capital as follows: The general contractor, receiving the payments, naturally holds the whip hand, and upon one pretext or another, may hold up payments, thus accumulating money upon which to run his business, while the sub-contractor must meet his bills for material and labor in the meantime. If the general contractor fails, the sub-contractor has no recourse on the owner, who can take his labor and material for which he has received no pay, just the same as that for which he has been paid.

The sub-contractors are also saddled with all kinds of claims for delays and penalties and with the responsibilities for non-compliance with plans and specifications, and in a great many cases very unreasonably so, and may be made to submit under penalty of not receiving their payments.

It is also difficult to secure an equitable settlement of disputes and claims arising between the work of the general contractor and that of the sub-contractors, due to the fact that the other parties concerned are represented before the architect and owner by the general contractor, who is naturally their opponent in such matters.

Again the owner may pay the general contractor a fair price for his equipment (based upon a good fair price from the sub-contractor to the general contractor at the time bids are taken) and the general contractor may shop around and either beat his sub-contractor down, or get an incompetent cheap substitute to do the work. Of course, in either case, the work is never as well done by an incompetent man, or by a competent one who has been beaten down in price, as by a competent one at a fair price.

Again, if the principal representative (among the contractors) is one having the greatest interest at heart in the building only, he will make the equipment, which is of great importance, so subservient of the rest, that it is impossible for the engineer or sub-contractor to secure the best results.

Also in cases where contracts are taken too low, or where the contractor may be desirous of securing an unfair profit at the expense of the owner, it is an easy matter for him to squeeze this out of sub-contractors, upon whom the blame can be laid and against whom the owner has no recourse. In the case where a general contractor takes work too low, he generally fails to realize this until most of the building contracts are let, and then whatever deficiency is to be recouped, must be made up out of the equipment.

In all of the above arrangements, the sub-contractor is the first loser, but the architect, the engineer, the general contractor, and the owner are perhaps greater losers, in the quality of the work, and general results attained; since the sub-contractor could well afford to do work better and cheaper under fairer and more agreeable conditions.

The principal argument the owner and the architect have against any of the above, is that by the employment of a general contractor, they are relieved of a great deal of responsibility and have only the one head to deal with, who is responsible for the full completion and co-ordination of the several branches of the work.

This argument can be shown to be a small matter, however, in comparison with the opposing evils as outlined above. It is a further fact, too, that the architect and owner by not coming into direct contact with the equipment work, have no direct assurance of what they are getting, or that this very important branch of the work is getting a fair and proper consideration. This whole matter goes back to the old proverb that "Whatever is worth doing, is worth doing right," which means that the architect and owner will always be well paid for their trouble in this connection.

As to disputes which may arise among several separate contractors, these arise

just the same under general contract. The only difference is, that the architect and owner do not hear so much about them, as a consequence, the work suffers.

These differences practically disappear whenever each contractor fully understands that the owner is to be the final court of decision and that each will get a fair and equitable hearing.

METHODS OF PROCEDURE.

In addition to its recommendations the committee outlines a definite method of procedure to accomplish the desired ends, as follows:

First. Deliberation and satisfaction with small returns to start with.

Second. The inviting of the appointment of a committee of one (1) from the architects, owners, contractors and manufacturers, to co-operate with the heating engineers in this movement. It should be made plain to these outside bodies that they are not to be committed to anything by the action of their representative, but that they will be thus kept in touch with the movement and would be expected to act through their own body as they saw fit.

Third. Circularizing the engineers of the East, sending each a copy of this report with the following questions:

Just indicate on a plain piece of paper the amount of your last year's fees and the highest, lowest, and average percentage which you received for your work, and mail same in a plain envelope to the chairman of this committee.

Also please send us your comments on the correctness and value of this movement, and state as to whether you will give same your support.

Fourth. Circularizing the engineering contractors throughout the East with a copy of this report and the following questions:

What is your opinion as to the correctness and value of this movement?

Will you give same your support and co-operation?

State the volume in dollars and cents of your last year's business.

What percentage of this was handled by engineers who are not contractors?

What percentage by engineering contractors?

What percentage by architects without regular engineering services?

What percentage without any engineers?

State what you know about the relative satisfaction to all concerned as given by the different jobs under the above differing methods of handling the engineering?

Your reply may be on plain paper, unsigned if desired, but please reply to the best of your ability.

Fifth. That the above data be used to start a set of statistics on the causes and effects of our status and the devising of means to better same. Also that this be followed out in the continued gathering of statistics and data to guide in this work.

Sixth. Practitioners in other professions require to be licensed by law and to have a State Certificate before they are allowed to practice. This is not true of the engineer and some of the above conditions are the result. A campaign is therefore for the passage of laws on this subject in the various States.

Seventh. That immediate steps be taken to interest every one possible in this work and that everyone of our members make it a special point to so interest himself. It is further recommended that every engineer first square himself with this movement and offer his objections and recommendations, and then after it is turned out as a finished product, let everyone constitute himself a committee of one to promote the idea. The committee states that it does not wish to be misunderstood, or to see any misunderstanding creep in which would stamp this as a revolutionary movement designed to create any Utopian conditions in the immediate future. It does believe, however, that there is a lot to be gotten out of concerted action in this field, and that a continuation of this work will produce results which will accumulate for the good of the profession.

Apparatus for the Study of Heat Radiation

By James D. Hoffman.

(*From a Paper Presented at the Semi-Annual Meeting of the American Society of Heating and Ventilating Engineers, at Atlantic City, September 16 and 17, 1915.*)

The apparatus described herewith was outlined by Professor James D. Hoffman and developed by G. C. Polk and L. C. Lichty, two senior students in the mechanical engineering department of the University of Nebraska.

Among the suggestions that prompted the development of the apparatus were the following:

1. In burning a stated amount of fuel does the total amount of heat given off as radiant energy remain the same for all rates of combustion? That is, having a number of equal samples of coal to be completely burned, each sample to vary in time of burning, will the heat radiated be a constant amount?

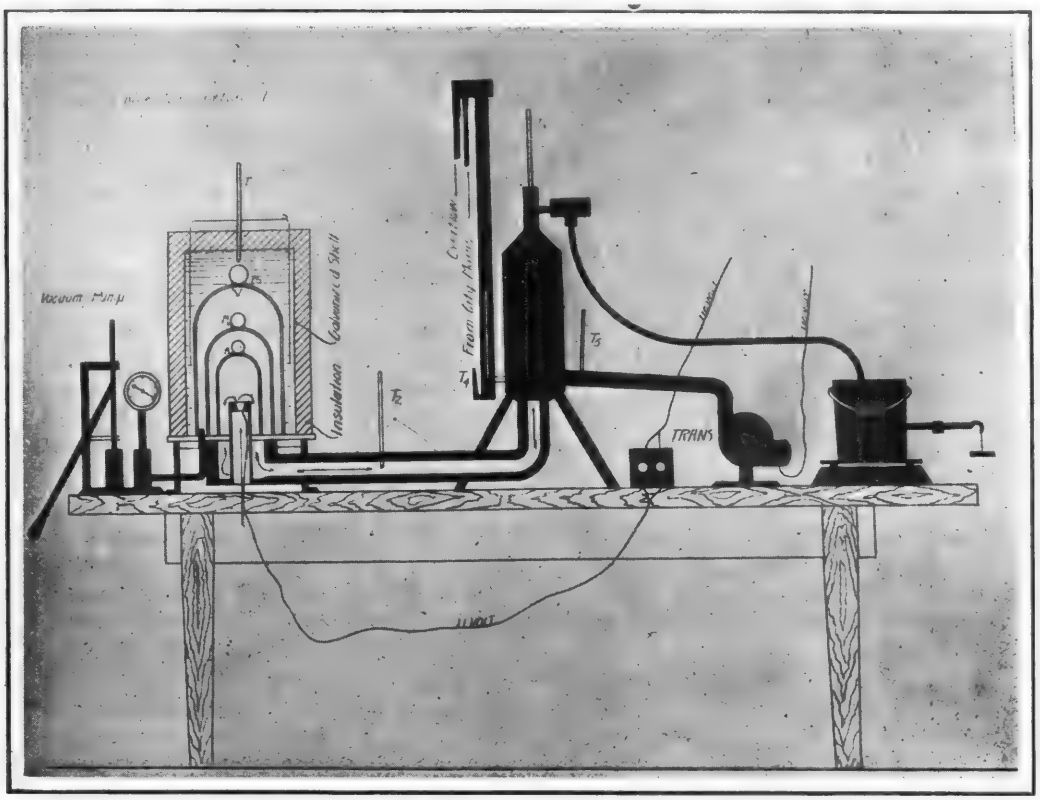
2. Is there a definite relation between the heat given off as radiant energy and that carried off by convection?

3. Is there one rate for combustion for every fuel that is the most economical rate?

4. In burning a given amount of fuel in a given time is it more economical to reduce the grate area and increase the rate of combustion?

Professor Hoffman states that after conducting a number of tests with the apparatus the data obtained seemed very encouraging, but not at all conclusive. It is evident that much more work will have to be done if dependable results are to be obtained.

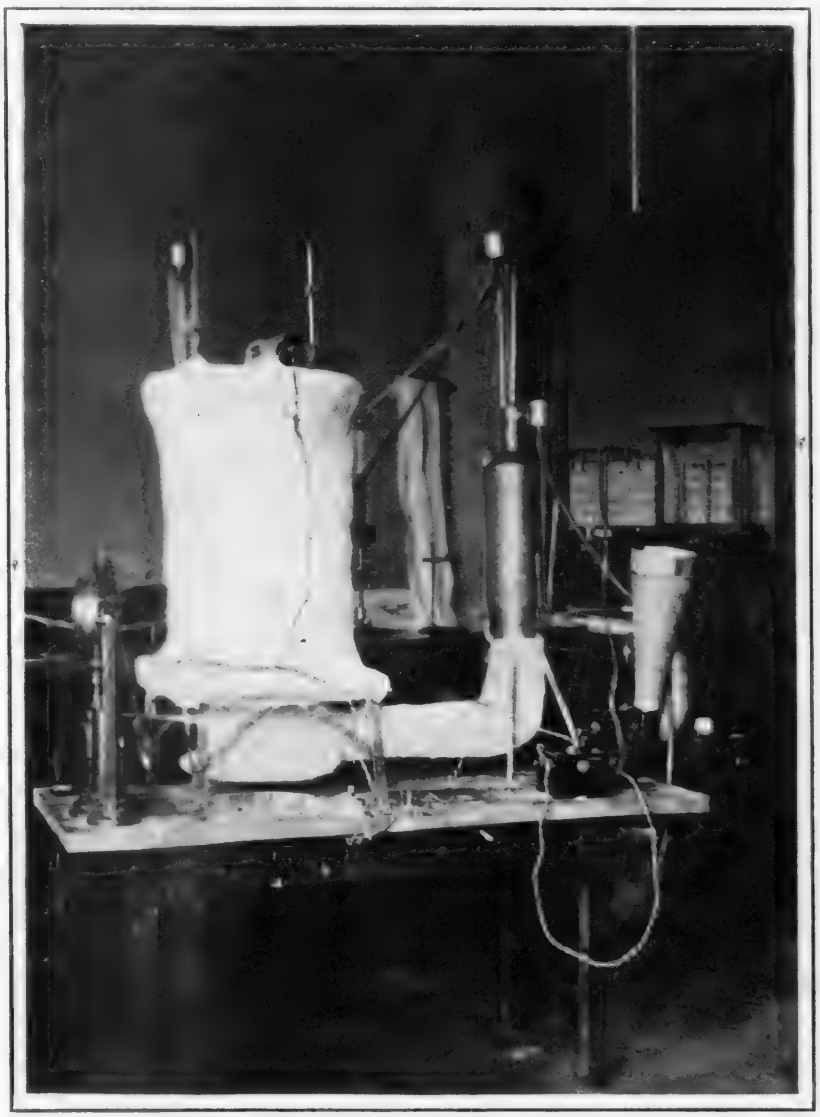
Fig. 1 shows the assembled apparatus. It comprises two calorimeters (one to measure the heat radiated and the other to measure the convected heat), a vacuum pump, a transformer, an electric motor fan and a weighing scale. All



APPARATUS FOR DETERMINING HEAT RADIATION.

the apparatus is standard except the calorimeter for measuring the heat radiated. This consists of a metal fire tube enclosing a clay fire pot through which the room air enters the combustion chamber (this tube is adjustable for height); one glass bell-jar, B_2 to protect the bell-jar B_2, from excessive heat; two bell-jars B_2 and B_3 enclosing an air tight compartment V (this compartment is connected with the vacuum pump); and a galvanized tank heavily insulated, forming a water chamber around bell-jar B_3. This water chamber is provided with a stirring device which is used just before taking readings. A peep-hole is arranged through the insulation at the side of the calorimeter and a reflector below the fire tube to observe the fire. Provision is made for temperature readings as follows:

Temperature of room .....T



TESTING APPARATUS IN OPERATION.

Temperature of water in radiant heat calorimeter .....T_1

Temperature of gases leaving fire chamber .....T_2

Temperature of water leaving Junker calorimeter .....T_3

Temperature of water entering Junker calorimeter ..... T_4
Temperature of gases leaving Junker calorimeter ..... T_5

The desired velocity and volume of the gases are obtained by a variable speed motor-fan and an anemometer located at the fan outlet. The pipe carrying the gases between the two calorimeters is thoroughly insulated. Any air pressure may be maintained in chamber V.

During the series of tests four degrees of pressure were maintained atmospheric, 10 in., 20 in. and 28 in. To assist the fire in starting, an eleven volt circuit with platinum glow is placed in the fire pot. The equivalent heat given off by this circuit is finally deducted from the experimental summation for the heat balance. Fig. 2 shows the apparatus in the process of construction and Fig. 3 shows it completed.

The method of procedure in burning any one sample of fuel is as follows: water is circulated through the Junker calorimeter and upon the temperatures T_3 and T_4 becoming constant the switch is closed, thus lighting the fire and starting the motor. The fuel usually begins to flame in one minute and the wire is kept hot for two minutes. After the first two minutes, the speed of the air is regulated to some definite speed so as to give a uniform rate of burning. As soon as the fire is out the velocity of the air through the anemometer is increased to 100 ft. per minute and kept constant until the end of the test to cool down the apparatus. All tests are run until the temperature of the incoming gases T_2 becomes constant, which usually occurs at one or two degrees above the room temperature. Then the fan is shut down and the water allowed to keep flowing through the Junker calorimeter until the difference between T_3 and T_4 is the same as at the beginning of the test. All thermometer and anemometer readings are taken every two minutes. The water is weighed at convenient times during the test. The residue left in the fire pot is weighed after each test and deducted from the amount in the original sample in each case. Analysis of heat values may be made of some of the original samples to obtain a basis of comparison.

The improvised calorimeter has given very satisfactory results in all points but two. First, the sample of fuel has never completely burned. Fire pots of varying shapes and sizes were tried and the total heat obtained from the test, i. e., the heat radiated across the vacuum to the water, plus that obtained in the Junker calorimeter, minus the heat equivalent of the electric circuit, never exceeded 95% of the heat value of the fuel as obtained by separate tests. Second, fuels with high hydrocarbon content had a tendency to coat the inner bell-jar and retard the radiant ray. No difficulty was experienced in maintaining the highest degree of vacuum in the space V or in otherwise handling the apparatus.

All things considered, the experimental results thus far obtained seem to justify further research.

THE BUSINESS OUTLOOK.

I.

By FRANK M. HUSTON,

Financial Editor of the Chicago Evening Post; Editor Rand-McNally Bankers' Monthly.

What is needed in this country most at the present moment is some of the old indomitable courage in the business world. Because there seems to be no precedent to be found in history to act as a financial guide in the present many seem to be disposed to pause and allow a golden opportunity to pass. A few long headed courageous men are quietly taking advantage of the lull to build future business.

It was the late J. Pierpont Morgan who made a remark a few years ago that has since become almost an axiom, warning people never to become a bear on the possibilities of this country. Mr. Morgan had the courage of his convictions and the son is following in his father's footsteps. He and other banking firms, such as Kuhn, Loeb & Co., are taking advantage of existing opportunities in arranging for a large credit for the European belligerent countries here, thus performing a greater service than most people imagine. These banking firms are not to be considered philanthropists. They are performing a service, it is true, but as a matter of fact they are good, far-sighted business men.

There is a big profit in this war banking and they propose to get that profit. In getting it they are bringing this country a large volume of business that we

need to keep our mills in active and continual operation, in a time of lax domestic business. But is this lax business, this restricted activity, really justified, even with the greatest war in all history under full sway in Europe? Let us see. It is true this war is destroying a very large amount of property, of wealth. This property or wealth is the basis of credit. It is not necessarily money. It is certainly not reserve money, as accepted in most nations of the world, that is being destroyed. In fact, practically no gold has been destroyed in this war, while gold accumulations as reserve have increased. Gold that has been hoarded has come out of hiding and gold used in the arts (jewelry, etc.) has been turned in and exchanged for credit.

Thus it will be seen that reserve money has increased, while wealth has decreased to the extent of the property destruction and the destruction of munitions of war and curtailed activity. Contraction of wealth means ultimately a contraction of credit. Just now, however, reserve money is accumulating and being hoarded in Europe, and this makes possible an enormous inflation of currency. A government in time of stress uses its credit just as does the individual or corporation. This is sound financing, providing it is not carried beyond actual needs. Sound principles of finance require that deflation take place as fast as the requirements for use of the credit pass.

Increased currency emissions and rapid circulation stimulate business; over-inflation brings currency depreciation. This is what Europe is now experiencing.

In this country we expanded our currency to meet the requirements of business here when our international credits became temporarily of no use as a banking asset. The moment that condition cleared, the emergency currency was retired. Our currency, therefore, is deflated, until it is now in about normal volume.

This country, therefore, is in a fundamentally sound position to meet any shock that might come out of the war. Our crops are very reassuring. A large yield of wheat, a big crop of corn and oats and other cereals will add something like $9,500,000,000 to our wealth. This is a basis for nearly $30,000,000,000 of new credit.

This means additional buying power in the agricultural sections and the small towns. This additional buying power, together with the benefits accruing from the war orders, affording employment to thousands of artisans, means the consumption of more merchandise of every sort, more building, more business for the carpenter, the heating contractor, the plumber, the lumberman, the brickmaker, the hardware merchant, and so on down the line. In fact, all lines of trade will be stimulated in consequence.

For many months, excess conservatism on the part of various lines of trade and of the consumer has resulted in a hand-to-mouth buying policy. With fundamental conditions sound, and with the necessity growing for a replenishment of many of the necessaries, there is every reason to look forward to a gradual expansion in business.

What is needed at the moment are courage and confidence. It will not do to sit idly by waiting for the economic readjustment that will follow the war. That may be years in developing; and, when it comes, we will be better able to accommodate ourselves to the new conditions because of our having proceeded in the meantime conservatively, but in a courageous way, to care for the business that is at hand. Speculation, of course, is to be avoided, but there should be no fear in reaching out for legitimate business in various ways. For the resumption of business depends upon the confidence and the courage to reflect it in business intercourse, and one may well base this confidence on the good physical and financial conditions of our country.

(Copyright, 1915, Kovnat.)

THE HEATING AND VENTILATING MAGAZINE

Vol. 12 October, 1915 No. 10

PUBLISHED MONTHLY BY THE

Heating and Ventilating Magazine Co.

1123 BROADWAY, NEW YORK

A. S. ARMAGNAC.....*President*
GUSTAVE PETERSEN....*Secretary and Treasurer*

A. S. ARMAGNAC, Editor
GUSTAVE PETERSEN, Business Manager

European Representative:
W. G. HOLLINWORTH, 304 High Holborn
London, W. C.

Subscription	$1.00 per year
Canada	1.25 " "
Foreign countries	1.50 " "
Back numbers	15 cents each
Back Nos. prior to current year	25 cents each

FOR SOME time those having the interests of the heating profession at heart have been endeavoring to place the profession on a higher plane by having this branch of engineering taken up by the colleges and universities in the form of a special course, with, possibly, a degree to be offered to graduates. It was felt that since a few of the universities were already giving a more or less exhaustive course on this subject, the time was ripe for inducing other institutions to follow their lead. Very little encouragement has been forthcoming, however, for two reasons. One is that the universities as a whole are not yet ready to admit that heating and ventilating is sufficiently distinct or advanced as a science to warrant a separate course. The other is more practical; it involves an assurance on the part of the trade and profession that places will be found for the graduates. In other words, the universities are perfectly willing to adopt a heating and ventilating course provided they may be sure it is going to be a practical success. This may smack of commercialism in educational affairs, but the proposition has considerable logic in it.

It is with this state of affairs in mind that the American Society of Heating and Ventilating Engineers has come forward with a proposal to start an engineering course on its own hook because, in the words of those who are fathering the idea, "it is realized that there is now opening a far greater need for the continuance and extension of the services (of heating engineers) to the profession and to mankind . . . and it is highly desirable for the general development of the profession, and for its greater usefulness to mankind, that entrants into these branches of engineering be as adequately prepared as are men who enter other branches of engineering;" also that "the dignity and usefulness of any branch of professional endeavor must depend upon the thoroughness with which its practitioners are equipped to cope with the problems which arise in their respective fields," and that "the greatest good may accrue to the heating and ventilating profession from a broad policy for the classification and dissemination of highly specialized knowledge."

While the plans, of course, are still in the formative stage, a fact that will assume increased prominence as the work proceeds is that heating engineers have "too infrequently been accorded the wide publicity which characterizes the common knowledge of other branches of engineering." This well expresses the issue and if nothing more is accomplished than the preparation of an instruction course that will serve as a standard or model for adoption by institutions of learning, it will go far toward giving the art the prominence and publicity it merits.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

Semi-Annual Meeting, Atlantic City, September 16 and 17, 1915

If anything like the plans proposed at the semi-annual meeting of the American Society of Heating Engineers in Atlantic City September 16 and 17, are carried out, the society will shortly inaugurate the most ambitious movement in its history to give wider publicity to the heating and ventilating profession. The plans involve the formulation of a course of lectures on heating and ventilating engineering, to be conducted under the auspices of the society. Various members of the society who are specialists in their line will be asked to contribute lectures with especial reference to their specialty. In this way it is hoped to develop a lecture course that will be more comprehensive than anything that has as yet appeared, and which will serve as the basis of a university course to be offered to the different universities. In the meantime the plan is to have the lectures delivered in those cities where society chapters are located.

The matter of the pressing need for wider publicity for the work of the heating and ventilating engineer came up through the report of the New York Chapter's Efficiency and Welfare Committee, the principal portions of which are published on another page of this issue. In an impressive discussion of this report, M. W. Franklin called attention to the underlying reasons for the present state of affairs and presented his suggestions for meeting them that were later crystallized in a resolution for a society course of instruction.

Mr. Franklin pointed out that all the trades have developed in advance of engineering. Buildings came before architects. In every line the engineer has developed after the art was established, and in many cases only after buildings became complex in their construction and equipment. It was so with electrical engineering and with mechanical engineering. At first, for instance, electrical manufacturers made motors and lamps by rule of thumb. Then as the trade developed it came to have electrical engineers who put the trade on an engineering basis.

During all of this development work the manufacturers had to act as consultants to get their apparatus used. In this way a class of experts was developed that linked the manufacturers with the consumers. The status of the engineer in Europe has advanced to such a point that when a man has, for instance, an electrical project in view, the first man he consults is the electrical engineer. There is no difficulty in getting the proper fee in the electrical field.

The trouble with heating and ventilating is that it is not recognized as a vital part of the construction. It is necessary to get the heating engineer more widely known. He is now regarded merely as an adjunct and accepted without being recognized.

Mr. Franklin referred to the new Government advisory board made up of experts in engineering lines and declared that the most important line of all had been ignored in the formation of the board—that of heating and ventilation. Submarines, for instance, cannot operate without good ventilation and yet there is no distinctly heating and ventilating expert at work on this problem.

Mr. Franklin's conception of engineering placed the subject in a new light. We have, he said, the purely scientific field and the commercial field. Engineering is a combination of these two. It is the link between the scientific methods of the laboratory and those of the commercial investor.

After further discussion of the subject the society adopted a resolution offered

by a committee composed of M. W. Franklin, J. A. Donnelly and Frank K. Chew recommending that a committee be appointed to consider the establishment of a course of study in heating and ventilating engineering and to prepare plans and recommendations to be presented at the next annual meeting in January.

Following is the full text of the resolution:

"Whereas the American Society of Heating and Ventilating Engineers has exerted an acknowledged influence for good on the practice in its special field, and those allied to it, and

"Whereas it is realized that there is now opening a far greater need for the continuance and extension of the services to the profession and to mankind, and

"Whereas courses of instruction in these branches of engineering are not generally available in the universities and engineering schools, and

"Whereas it is highly desirable for the general development of the profession, and for its greater usefulness to mankind, that entrants into these branches of engineering be as adequately prepared as are men who enter other branches of engineering, and

"Whereas the dignity and usefulness of any branch of professional endeavor must depend upon the thoroughness with which its practitioners are equipped to cope with the problems which arise in their respective fields, and

"Whereas the greatest good may accrue to the heating and ventilating profession from a broad policy for the classification and dissemination of highly specialized knowledge, and

"Whereas this society numbers among its membership many capable experts whose knowledge has too infrequently been accorded the wide publicity which characterizes the common knowledge of other branches of engineering;

"Therefore, we respectfully recommend that The American Society of Heating and Ventilating Engineers should authorize the appointment of a committee to present at the annual meeting of the society, in January, 1916, plans and recommendations for a graduate course, to be given by the society, in the fundamentals of heating and ventilating engineering, and the allied branches, whose object will be adequately to prepare engineers more advantageously to enter upon the practice of heating and ventilating engineering."

The resolution was signed by Milton W. Franklin, Frank K. Chew and James A. Donnelly.

First Session, Thursday Afternoon.

Considering the fact that the place of the meeting had been changed from San Francisco to Atlantic City at a late date, the registration of about 60 members and guests was well up to expectations. The professional sessions were held in the solarium of the Marlborough-Blenheim Hotel, directly facing the sea. It proved to be as cool a spot as could have been selected, for the weather was notably hot, although the evenings were clear and mild.

The first session was opened by President D. D. Kimball. After referring to the efforts that were being made to increase the society's membership, he urged that an amendment to the constitution be passed at the next annual meeting providing for the election of new members by the council instead of by the membership as at present. The present method he said, was unnecessarily expensive and cumbersome.

As a result of the inauguration of the society Journal, President Kimball said that the society's income had increased from $6,500 to about $10,000 a year. This has made it possible to publish the Proceedings to date and still leave a balance in the treasury.

Reports were then read from the Illinois, New York and Massachusetts Chapters covering their work for the year. Announcement was made that Vice-President Frank T. Chapman was unable to attend the meeting on account of illness. This led to the passage of a resolution by the meeting that a message of greeting be sent him, with best wishes for his speedy recovery.

At this point the chairman introduced D. L. Gaskill, secretary of the National District Heating Association, who was in Atlantic City in attendance at a meeting of the executive committee of that body. Mr. Gaskill pointed out that, while the general scope of the two societies was sufficient to justify the existence of each,

there were nevertheless many items on which they could co-operate with mutual advantage, such as the work of the educational committees and he urged a wider and fuller exchange of information and other data.

A report was presented of the committee to co-operate with the National Fire Protection Association, A. M. Feldman, chairman, which gave further information of the modifications which had been secured by this committee in the requirements of the National Fire Protection Association. Attention was called to the fact that in the effort to provide all the desired safeguards against fire, the fire protection interests were liable to impose undue restrictions on the installation of heating and ventilating apparatus and that the society should be careful to watch the promulgation of new requirements. James A. Donnelly stated that this was all the more important, because laws may often be overlooked, but failure to comply with the requirements of the fire underwriters means the refusal of fire insurance.

REPORT OF COMMITTEE ON EFFICIENCY AND WELFARE.

Probably the most important report presented at the meeting was then taken up. This was the report of the New York Chapter's committee on Efficiency and Welfare, Perry West, chairman, which had been referred to the society by the New York Chapter. As will be noted from the abstract of the report on another page of this issue, the subjects taken up include membership standards and the licensing of engineers, the status of the engineer in his own field, engineering fees, the efficiency of engineering, responsibilities of the engineer, the separation of contracts, co-operation with others and, finally, the principles of professional practice. In a written discussion Mr. West stated that there have been very few, if any, tangible results since the movement was started by the New York Chapter last February. "Outside of seeing," he added, "that most of our members survived the shock which they underwent when we first advanced the idea last spring that the engineer should be the man to control engineering, which means the biggest end of all construction undertakings, and every now and then hearing some of our members talk out real loud along these lines, we are not able to point out many other results. As far as my observation goes, engineers in the meantime have been catering largely to other interests, cutting each other's throats occasionally and sitting by while the profession is being made a general football by those who come in contact with it."

In connection with the matter of engineering fees, Stewart A. Jellett, who was present, gave an account of the early efforts of the society in this direction some ten years ago. The matter was taken up at that time with the American Institute of Architects and eventually a resolution was adopted by the architects providing for the payment of engineering fees in addition to the architects' fees, where the work required engineering services.

Mr. Jellett expressed it as his belief that the trouble was not so much in connection with a schedule of charges as it was due to the fact that many heating engineers do not approach the problems presented to them from the owners' or from an engineering standpoint. Too often they look to see how much they can get out of it. Some engineering propositions, for instance, will not pay commercially and engineers should not lead owners astray by endorsing plans for improper or incomplete equipment.

Mr. Jellett also spoke of the practice of some manufacturers to make elaborate plans and declared that it was frequently the only way by which they can bring their specialties to the attention of the public. This practice, however, makes it difficult for the heating engineer to obtain commensurate fees on small work. There are more opportunities for securing suitable fees on large work.

Speaking to the same report, Mr. Donnelly made a plea for greater attention to the matter of engineering education and declared that the heating engineers' society should induce the colleges and universities to grant degrees in heating and ventilation.

At this point the president was au-

thorized to appoint a committee to carry on the work of the New York Chapter's Efficiency and Welfare Committee.

Mr. Donnelly then presented his paper on "Establishment of Standard Methods of Proportioning Direct Radiation and Standard Sizes of Steam and Return Mains." This paper formed part of a report presented before the National District Heating Association and was published in part in THE HEATING AND VENTILATING MAGAZINE for July, 1915. In the discussion of the paper S. Morgan Bushnell commended the methods given for figuring radiation as he had made a number of tests in which he checked the average amount of fuel consumed in certain buildings and in comparing the results with those theoretically required, according to the rules given, he found that they checked closely.

A discussion over the use of small return pipes from radiators brought out the point that while they might be correct from a theoretical standpoint, they are likely to become bent by being stepped on, also where the return is run under a floor with a cinder fill, a small pipe may easily become trapped, a condition which may cause considerable trouble. For these reasons it was stated that pipe less than 1 in. in diameter should not be used, although M. S. Cooley placed the minimum at ¾-in. pipe.

Second Session, Thursday Evening.

The first paper of the evening session was on "Establishment of a Standard of Transmission Losses from Building of of all Constructions," by Reginald Pelham Bolton. This paper was also part of the educational committee's report presented before the National District Heating Association and was published in THE HEATING AND VENTILATING MAGAZINE for July, 1915. The figures given in Mr. Bolton's tests showing the high temperatures of the wall directly behind a radiator placed close to the wall, brought out a statement from Mr. Cooley that experiments had shown the advantage of placing insulation against the wall directly back of radiators to prevent undue heat absorption by the wall.

A paper was then read on "Engineering Data for Designing Furnace Heating Systems," by Prof. A. C. Willard. One of the most significant statements made in this paper was that "water pans or humidifiers of the positive type only, with direct heating surface should be installed, and should have an evaporative capacity sufficient to maintain a relative humidity from 40 to 50% at 70° F., when the air enters at 32° F. and 25% saturated. Such pans or tanks must have an automatic feed under ball cock control in order to be effective. When the outside temperature approaches zero the interior humidity must be reduced to 40% or less to avoid condensation on cold surfaces."

The question was asked, during the discussion, whether any warm air furnace now on the market is equipped to give this amount of humidity at the temperature stated, and it was brought out that none of the humidifying appliances used with warm air furnaces can supply such an amount of humidity.

The difficulty of securing proper results with narrow air flues was pointed out by Frank K. Chew who stated that the proper proportioning of such flues was one of the prime requisites of good furnace heating design.

The next paper was on "Experiment in Ventilating a School Room." This was part of the report of the Chicago Ventilation Commission which was reviewed in THE HEATING AND VENTILATING MAGAZINE for May, 1915. The results of the experiments in this particular room were previously published in THE HEATING AND VENTILATING MAGAZINE for December, 1913. The room was especially fitted up, containing an air-tight false-floor built about 18 ins. above the regular floor of the room, while a false ceiling was hung about 8 ins. below the room ceiling. Tests were then made under varying conditions of air supply and removal.

In the discussion of this paper, J. D. Cassell stated that in the Philadelphia schools it is the customary practice to place direct radiators under windows, the wall directly back of the radiators being lined with a non-conducting covering.

President D. D. Kimball told some of the recent experiments conducted by the

New York State Commission on Ventilation in Public School 51 in the Bronx. There, he said, difficulties were found in securing devices that would show both slight vertical and slight horizontal movements of air. Strips of tissue paper attached to sticks were useful in determining lateral air currents but would not be affected by slight vertical currents. By arranging the tissue paper so that it presented slanting sides, it was now possible to measure both vertical and lateral currents. He said the slight movement of the paper would indicate almost ideal diffusion but that such diffusion was not found to be accompanied by ideal ventilation.

Topic No. 1 was then taken up: "Do the general names of 'air line return system' and 'vacuum return system' best distinguish the modern type steam systems from the common one and two-pipe systems?"

(A discussion of this topic will be found on another page of this issue.)

In discussing this topic Mr. M. S. Cooley said that one name such as "air return system," to distinguish all systems in which the air is removed through the returns is sufficient. The use of the word "vacuum," he added, makes it hard to tell where to limit such systems, as many systems claim a vacuum which use no pumps whatever, but depend on condensation in the radiators to produce a temporary vacuum.

Topic No. 2: "How long can vapor-vacuum heating systems be operated as closed systems without air binding?"

Mr. Cooley: This depends on the conditions under which the system is closed. If closed when the rate of combustion is less than required to supply all radiation in use, the system will be under a partial vacuum and the length of time it will take to become air bound depends on the tightness of the system, as air will tend to leak in through every joint. If the system is closed under pressure and some parts of it contain air, this air will remain until the vent is again opened, as no air can get out except by leakage. Such leakage will be much less than under a vacuum, as the difference in pressure will not be over 2 or 3 lbs., while we may have a difference of 8 or 9 lbs. with a vacuum.

Topic No. 3: "If operated as an open system, should the sizes of supply piping and radiation be larger than required for 1 to 5 lb. pressure systems?"

Mr. Cooley: I cannot say that they should not be larger than required for higher pressure, but they certainly do not need to be as large as are ordinarily used for such systems.

Topic No. 4: "In the open system should the drop in pressure in supply mains due to friction and condensation be considered in deciding the static head required to return the water to boiler against pressure?"

Mr. Cooley: I see no reason why such friction has any effect on the static head as the entire system including radiators and piping beyond the supply valve to the radiators is under atmospheric pressure and the static head must be suffiicent to cause the water in the return pipe which is under atmospheric pressure, to enter the boiler against the pressure therein. Of course, the loss of pressure in the mains must be considered in determining the boiler pressure necessary to supply steam to the radiators and may thus affect the head indirectly, if you look at it that way.

Third Session, Friday Afternoon.

A paper on "Measurement of Air Flow," by Arthur K. Ohmes was presented at the opening of the afternoon session on Friday. This was an elaboration of an address delivered by Mr. Ohmes before the New York Chapter of the society last winter. Early methods of air measurement were shown, showing the development of such methods from their inception. The various classes of air measuring instruments were taken up at length.

Mr. Ohmes' paper was discussed by Dr. E. V. Hill, who wrote that the paper was very well written and a valuable contribution to the society, and added:

"He discusses methods of making air measurements in a manner so complete and scientific that it makes me feel that I have yet much to learn regarding this important subject. I did not even know that there was such a thing as a friction-less anemometer and shall endeavor to obtain one if possible.

"He describes the A. B. C. tube as the standard in this country. While I feel that the American Blower Co. is entitled to the credit of introducing and standardizing this tube, still it will be remembered that our society has adopted a tube varying slightly from the specifications of the A. B. C. tube which we had hoped to make the standard.

"Mr. Ohmes' evolution of his formula is very plainly worked out but it appears to me that inasmuch as most of our engineering books give the weight of air in pounds per cubic foot, and also inasmuch as our anemometer readings and specifications on plans call for velocities in feet per minute the formula

$$v=1096.5\sqrt{\frac{P}{W}}$$

is in better shape for our use than the one suggested by Mr. Ohmes. You will note from Mr. Ohmes' formula v is in feet per second while ours is in feet per minute. I have rearranged the formula slightly, squaring the constant 1096.5 and placing it beneath the radical and from this plotted a curve for determining directly the velocity from any combination of P and W that comes within the range of ordinary practice.

"I am making some experiments at the present time in reading the variations of water column in a finely graduated tube by means of a Leitz micrometer eye piece used in microscopic work. This is arranged with a micrometer screw and vernier and variations in the column up to 1/1000 in. can be easily determined. The difficulty in these experiments has not been in measuring the variations in the column, but rather in getting a column that is quiet enough to measure. It is possible that a tube may be devised on which a certain velocity reading can be taken and the air current shut off, allowing the water column to become stationary and the difference read in this manner. This would give us a method of reading variations accurately to 1/1000 in. or even less.

"Regarding the use of Venturi meters and throttling nozzles, I have felt that the Chicago chapter should take up some experimental work along these lines, as it appears that an instrument could be devised for making use of this principle."

Arthur T. Ritter stated that the A. B. C. tube does not differ in any material degree from that proposed by the society.

The next paper was on "Determination of Pipe Sizes for Hot Water Heating," by Prof. F. E. Giesecke. This was a lengthy discussion of the Rietschel system of hot water heating and Prof. Giesecke's presentation was highly commended by Arthur K. Ohmes who sent in a written discussion of the paper. The paper included the application of this system in the academic building of the Agricultural and Mechanical College of Texas which was illustrated with plans of the layout. Numerous velocity and friction curves were also incorporated in the paper.

Prof. J. D. Hoffman contributed the next paper which was on "Apparatus for the Study of Heat Radiation" (This paper is published in full on another page).

Before the final paper on the program was taken up a break was made to consider the report of the committee that formulated the resolution providing for a lecture course on heating and ventilating, to be conducted by the society. The report aroused a lengthy discussion.

One point brought out was that the colleges and universities which have been approached with the idea of establishing a heating and ventilating course have mostly refused to do so on the ground that the art is not of sufficient importance to warrant a degree. It was shown that if the society waited for the colleges to inaugurate a suitable course it would be a long time in coming. As to those colleges which now have heating and ventilating courses, it was felt that where they are developed and conducted by any one man, the courses are apt to reflect the prejudices and individual opinions of the man in charge.

On the other hand, if a course were prepared by the society, the different phases of the subject could be prepared by experts in that particular line, with the result that the completed course would constitute a curriculum that would be superior to anything that the colleges had to offer.

There were some expressions on the

other side of the subject the view being taken by several that the society was going somewhat out of its field to inaugurate a course of study in heating and ventilating and that the practical difficulties in carrying out the idea would prove to be insurmountable.

The committee that was appointed will take advantage of the interval between now and the time of the annual meeting to make a full investigation of the possibilities in conection with the course and report at the annual meeting.

The final paper on the programme was then presented being entitled, "Can We Locate the Neutral Zone in Heated Buildings?" by J. J. Blackmore. Among those who discussed this paper was W. H. Driscoll who gave it as his opinion that in the case of a large building divided up into offices there would be a number of neutral zones, all at different levels. Mr. Driscoll gave an interesting review of the difficulties experienced in connection with heating the drug store at the northwest corner of the Hotel McAlpin in New York. In this store a rear door opened onto the lobby of the hotel and on account of the indraft from the street into the store it was necessary to add about one-third to the amount of radiation originally calculated for this store.

As the hour was growing late the remaining topics for discussion were held over until next January and the meeting thereupon adjourned.

Convention Notes.

During both days of the meeting chair rides were provided for the ladies, while tickets for the Steel Pier were available to those wishing to hear the band concerts and other attractions on this pier.

With each morning free a number of bathing parties were arranged, the warm weather making the sea especially attractive.

The dinner and dance Friday evening were omitted. Friday evening was the warmest of the meeting and the members and guests were well satisfied to enjoy the pleasures of the Boardwalk and ocean breezes.

The following were registered:

MEMBERS AND GUESTS PRESENT.

D. D. Kimball, New York.
Homer Addams, New York.
J. J. Blackmore, New York.
James T. J. Mellon, Philadelphia.
Maxwell S. Cooley, Washington, D. C.
G. W. Barr, Philadelphia.
E. E. McNair, Detroit.
W. G. R. Braemer, Camden, N. J.
J. D. Cassell, Philadelphia.
F. E. W. Beebe, New York.
Bert C. Davis, Elmira, N. Y.
G. B. Nichols, Albany, N. Y.
E. C. Wiley, Lynchburg, Va.
A. E. Hall, Albany, N. Y.
John Morton, New York.
H. R. Dillon, Chicago.
B. H. Davis, Philadelphia.
H. R. Wetherell, Peoria, Ill.
B. K. Strader, New York.
James A. Donnelly, New York.
P. H. Seward, New York.
E. K. Lanning, Camden, N. J.
E. T. Murphy, Philadelphia.
S. A. Jellett, Philadelphia.
A. P. Goldsmith, Philadelphia.
Charles R. Bishop, Lockport, N. Y.
Walter J. Kline, Lockport, N. Y.
A. E. Carpenter, New York.
S. Morgan Bushnell, Chicago.
D. L. Gaskill, Greenville, O.
M. W. Franklin, East Orange, N. J.
Nels T. Sellman, New York.
Oscar Fogg, New York.
Louis P. Monash, New York.
Arthur Ritter, New York.
Frank P. Keeney, Chicago.
Samuel L. Greason, New York.
J. F. McIntire, Detroit.
S. E. Plews, Philadelphia.
H. R. Watson, New York.
W. H. Timm, Philadelphia.
A. S. Mappett, Philadelphia.
Henry G. Issertell, New York.
T. H. Hill, Cleveland.
J. I. Lyle, New York.
H. H. Hellermann, Philadelphia.
A. S. Armagnac, New York.
G. W. Martin, New York.
Frank K. Chew, New York.
Maxwell F. Gilbert, Philadelphia.
George Boon, Philadelphia.
E. I. Hetherington, Philadelphia.
W. S. Moffit, Staunton, Va.
H. D. Bristol, New York.
Frank Shay, Newark, N. J.
H. W. Pfeffer, Philadelphia.
G. Petersen, New York.
H. C. Beatty, Philadelphia.
W. H. Driscoll, Jersey City, N. J.
J. F. McElfairich, Buffalo.
Robert R. Jones, Harrisburg, Va.
C. L. Riley, Plainfield, N. J.
W. E. Tinker, Philadelphia.
C. C. Winterstein, Philadelphia.
E. F. Kingsbury, Philadelphia.
D. S. Boyden, Boston.
W. J. Marshall, New York.
Mrs. B. K. Strader.
Mrs. E. T. Murphy.
Mrs. A. E. Carpenter.
Mrs. T. H. Hill.
Mrs. J. I. Lyle.
Mrs. H. H. Hellerman.
Mrs. A. S. Armagnac.
Master Alden P. Armagnac.
Miss Emily D. Packard.
Mrs. Frank K. Chew.
Master Frank K. Chew, Jr.
Mrs. Homer Addams.
Mrs. Champlain L. Riley.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

New York Chapter.

Arrangements have been made to hold the opening meeting for the season of the New York Chapter at Keen's Chop House, 70 West 26th Street, New York, Monday, October 18. Following a chapter dinner, the members will be addressed by Rawson Vaile of the American Blower Company on "Export Engineering" and by R. D. Hopkins on "Engineering Work in China." Mr. Hopkins has spent several years in China on engineering work for the Chinese government.

Illinois Chapter.

The annual meeting of the Illinois Chapter was scheduled to take place Monday, October 11, in the New Morrison Hotel, Chicago. The principal business was the election of new officers.

Increase in Membership.

Efforts to increase the membership of the American Society of Heating and Ventilating Engineers have resulted in an addition of 110 new members during the present year, up to July 1.

British Heating Engineers.

The accompanying group photograph of the heating engineers present at the midsummer meeting of the Institution of Heating and Ventilating Engineers at Leamington, England, June 22, will be of interest in showing the faces of many of the members who are known only by name to most American engineers. The president of the Institution, H. H. Grundy, is shown seated in the center of the second row. Secretary W. G. Hollinworth is shown standing in the back row at the left of the picture. The second and third figures in the second row at the left are G. Crispin and E. Hering.

Turning to the right of the photograph, W. Yates is shown third from the end in the back row. Standing next to Mr. Yates on the left is S. Naylor who has been spoken of as in line for higher honors in the Institution.

International Engineering Congress.

The program for the general sessions of the International Engineering Congress, held in San Francisco, September 20-25, included a session on heating and ventilation. An introductory paper was presented by Prof. R. C. Carpenter, of Cornell University, describing recent advances in the heating and ventilating field. This was followed by a paper on "Recent Developments in Heating and Ventilation Art," by D. D. Kimball, president of the American Society of Heating and Ventilating Engineers, and another on "Vacuum, Vacuo-Vapor and Atmospheric Heating Systems," by Prof. J. D. Hoffman, of the University of Nebraska.

Among the papers to be presented at other sessions are the following: "The Struggle Against Dust," by C. C. Dassen, inspector-general of streets in Buenos Aires; "Power Plant Design," by H. S. Putnam, of New York; "The Boiler of 1915," by Arthur D. Pratt, of the Babcock & Wilcox Co., New York; "Pulverized Coal in Reverberatory Furnaces," by D. H. Browne; and "Burning Pulverized Coal in

BRITISH HEATING ENGINEERS AT LEAMINGTON, ENGLAND.

Copper Reverberatories," by E. P. Mathewson, of Anaconda, Mont.

The congress is calling renewed attention to the fact that membership in the congress is open to all. The fee is $5.00, which includes, without extra charge, the index volume and any one other volume. Vol. II, entitled "Miscellaneous," will contain the papers and discussions on heating and ventilation. The headquarters of the congress are in the Foxcroft Building, San Francisco, Cal.

NATIONAL DISTRICT HEATING ASSOCIATION

Arrangements for Next Annual Meeting.

The selection of New York City as the place for holding the next annual meeting of the National District Heating Association was one of the important actions taken by the executive committee of that association at its fall meeting in Atlantic City, September 16-18. Headquarters will be at the Hotel Martinique. The committee was represented by President David S. Boyden, Secretary D. L. Gaskill, H. R. Wetherell and George W. Martin.

It was decided to have an exhibit during the convention; also to have a four days' convention, the dates fixed being May 23, 24, 25 and 26, 1916. The program as arranged for contemplates four papers, seven reports of the standing committees and three addresses. It was also decided to hold the annual banquet Thursday evening, May 25.

Some of the subjects which will be considered in papers and addresses are as follows: "District Heating and Its Relation to Electric Utilities Operation"; "Appraisals of Utility Property"; "Ratio of Economizing Coils of the Different Types of Heating Systems"; report of delegates to the Pan-American Congress; report of Station Operating Committee; report of Educational Committee; report of Rate Committee; report of Record Committee; report of Public Policy Committee; report of Underground Construction Committee.

The resignation of William S. Monroe, of Chicago, as a member of the executive committee was received, as he found it to be impossible to perform his duties owing to his work in that city.

It was decided to submit an amendment to the constitution reducing the publication committee from five to three members and making the publication committee consist of the president, past-president and the secretary. It was also decided to approve constitutional authority for filling a vacancy on the executive committee.

The convention committee selected to take charge of the arrangements for the convention in New York is: George W. Martin, of the New York Service Company; Charles A. Gillham, of the New York Steam Company, and E. F. Tweedy, of the New York Edison Company.

It was also decided to assign four persons to discuss each paper and report of the standing committees presented to the convention, such assignment to be made in advance of the convention and copies of papers and reports to be furnished such persons so selected.

Reports of the work of the association showed it to be in a splendid condition both financially and in number of members.

Varying Views on the Proposed Standard Title for Return Line Systems.

A canvass of some of the principal manufacturers of vacuum and vapor heating systems regarding the proposal to adopt the name, "Air Return Line Systems," as a general classification for many of the vapor and vacuum heating systems now on the market, was made recently by The Metal Worker. The name "air return systems" was intended to be a general descriptive title for heating systems now known by various names, such as "atmospheric," "modulation," "thermograde," "fractional," "vapor" and "vacuum." The point was made that it would then be easy to differentiate the various systems by adding the particular trade name, such as "atmospheric air return system," and "modulation air return system," etc.

One manufacturer expressed the opinion that the proposed name would not accomplish the desired result as it does not make a distinction between the closed and open special systems. He also stated that he does not believe it would be well to attempt to cover both open and closed air return line systems under one head.

Another manufacturer, Reuben N. Trane, of Trane Co., favored some other title than air return line systems as these are generally known as having an air valve and a small return line back to the boiler or vacuum pump. He suggested the name, "special heating system."

Bishop-Babcock-Becker Company did not consider the proposed title advisable for the reason that there is a distinction between the system where the air is only pumped out of the radiators by means of a vacuum pump and the system where both the air and condensation are pumped or

drawn through a return line. This, they held, also applies to the vapor system where no pump is used and in which the air is forced out through return condensation lines and a check valve provided to prevent re-entry of air. This company expressed the opinion that the three systems really call for three distinctive names.

While endorsing the idea of using one general name, the American District Steam Company does not favor the adoption of any name that will eliminate the company's term "Atmospheric," as this would tend to eliminate the individuality of the company's system. With that exception the company stated that the name of "air return line system" appears to be very logical.

Full endorsement of the proposed name was given by the Chicago Pump Co., the Roys Heat Control Co., of Brooklyn, N. Y., and the Vacuum Heating Co., of Philadelphia.

The C. A. Dunham Company objected to the use of the particular name suggested on the ground that air return leaves out the essential feature of all later day heating systems, as they are not only air return systems, but air and water return systems. It was suggested that a better name would be "return line systems," leaving off both the words "water" and "air." Return line could refer to either water or air or both and in that way take into account all specially advertised systems of heating.

A Heating Engineer on Subway Ventilation.

An exhaustive history of New York subway ventilation and a proposed remedy for the existing conditions are contained in an illustrated brochure on the subject which has been compiled by James G. Dudley, consulting engineer, New York. The author commences by calling attention to the present lack of ventilation in the New York subway, as understood in modern engineering circles. An illustration of the original design of this subway shows that no provision was made for ventilation by those responsible for the design. When the first warm weather came, the engineers described the conditions as "unexpected," and indicated that they expected the subway to ventilate itself.

It is brought out that 85% of all the energy generated at the power stations of the subway is dissipated in the form of heat inside the subway itself in various ways.

The first alteration in the New York subway was the punching of holes in the covering to permit the escape of the heated air. However, as no draft was provided, this failed to solve the problem. In addition to this, an effort was made to cool the subway air through the use of air washers, the air being recirculated through the washers by blowers. A well, driven to a considerable depth, furnished the cold water used. This, owing to the lack of capacity when the cubic contents of the subway are considered, did little or nothing to relieve the situation.

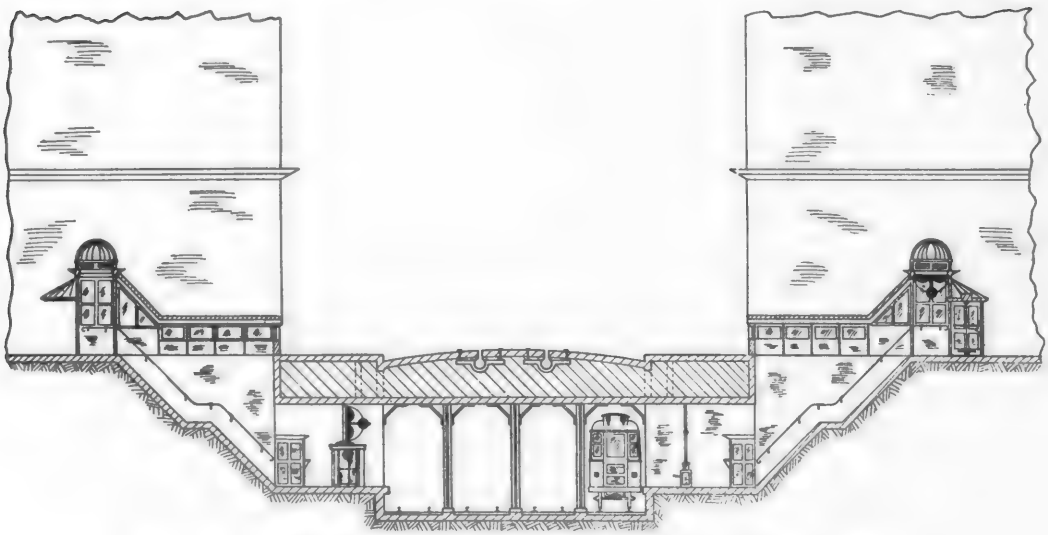
Later on there were installed at various points in connection with the roof openings some 25 blowers, each of which was capable of exhausting 1,000,000 cu. ft. of air per minute. This, according to the chief engineer, afforded some relief.

The next change was the construction of vent chambers between stations at the sides of the subway, being an attempt to control the inflow and outflow of the subway air by the piston-like action of the trains. Louvres were hung in an ingenious manner in the side wall of the subway. The flaps were intended to open as the trains passed and close immediately thereafter, the suction thus created drawing in fresh air at the stations.

Mr. Dudley states that the trains do not act as pistons within a cylinder as the tracks are not separately sealed. During the last few years it is stated that there appears to have been no further attempts to ventilate the subway, except that "agitator" fans were installed in the cars themselves.

When the new dual system of subways was started, in 1913, the plans of the engineeds provided for the cutting of holes in the sidewalks along the route of the subway and adjacent to the retail stores. Blowers were to be installed in these vent chambers to discharge the air from the subway. Our readers are familiar with the protests that were evoked by this plan. Mr. Dudley emphasizes the fact that there is omitted entirely any control of the points of admission of the air drawn in as a result of the action of the fans which, he says, will result in short-circuits of air, to say nothing of the objections of dusty air being expelled through the street openings.

The author then discusses the various plans that have been proposed by outside parties, some of which were illustrated and described in THE HEATING AND VENTILATING MAGAZINE for August, 1915. An additional scheme, described by Mr. Dudley, is that proposed by Henry G. Opdycke, engineer for the Broadway Association. This



DUDLEY "SECTIONALIZED" SYSTEM OF SUBWAY VENTILATION.

scheme contemplates cutting ducts through the side walls of the subway into and through the basements of abutting properties at intervals along both sides of the subway, and then erecting on private property chimneys extending well above the roofs of the surrounding buildings and discharging therefrom air from the subway by means of large blowers with powerful electric motors placed at the entrance of the ducts or at the base of the chimneys referred to.

After showing the plan suggested by George Hallam Clark (published in THE HEATING AND VENTILATING MAGAZINE for May, 1915), Mr. Dudley proceeds with a lengthy presentation of the Dudley "sectionalized" system of subway which he has designed (also described in THE HEATING AND VENTILATING MAGAZINE for August, but shown in the circular in considerably fuller detail). Mr. Dudley's design is based on the following fundamental contentions:

1. Adequate mechanical ventilation of any subway is absolutely essential to the safety and comfort of passengers and incidentally attracts traffic and insures profit.

2. Subways elsewhere are adequately ventilated by means of mechanical, that is fan, methods.

3. The subways of New York City never have been, and are not now, adequately ventilated, either on the score of passenger safety, comfort or profits.

4. The subways can be adequately ventilated by means of fans driven by electric motors taking current from a source or power other than that for train propulsion.

5. The problem of mechanically ventilating all the subways in New York is wholly a question of which one of the many plans proposed for so ventilating the subways shall be adopted.

Would Divide Subway Into Sections.

As will be seen from a reference to the Dudley scheme, it is proposed to divide the subway into sections, each of which will have a separate ventilating installation. A typical section will have, say, four electric fans at the various entrances and, in addition, "air-locking" doors will be provided to prevent the ingress or egress of air through the regular passenger entrances. In that portion of the present subway between the Battery and 96th Street a total of twenty installations would be needed, including 100 54-in. fans exhausting a total of 2,700,000 cu. ft. of air per minute. If these fans consumed 10 H.P. each, there would be required a total of 1,000 H.P. hourly to ventilate this assumed portion of the subway. If operated 20 hours daily for 200 days in the year, and if the cost of electricity be taken at 1c. per horsepower-hour the total annual cost would be $40,000. Of course, with this system the present sidewalk gratings and other such intentional or chance openings would be sealed or otherwise done away with.

Mr. Dudley concludes with the interesting statement that the subways of New York, when completed, will, it is estimated, comprise more than 240 miles of track and will have cost more than $250,000,000 and will carry more than 2,000,000,000 passengers per annum.

THE CONSULTING ENGINEER

The Consulting Engineer" is prepared to reply, in this department, to any questions which our readers may ask regarding problems connected with the design and installation of mechanical equipments of buildings.

CONDUCTED BY IRA N. EVANS, C. E.

52—Overcoming Back Pressure in Heating Systems.

QUESTION: The statement has frequently been made that if an engine exhausts to the atmosphere against 2 lbs. back pressure, by increasing the initial boiler pressure to 5 lbs., a back pressure of 5 lbs. due to the heating system, could be overcome without any additional cost or reduction in power obtained. Is this correct?

ANSWER: No, this is not so. The additional heat per pound of steam is very little in B. T. U., but the steam is denser at the higher pressures, requiring a greater weight for cubic foot. The increase in initial pressure is always much greater than the back pressure to maintain the same mean effective pressure.

There are four ways of overcoming back pressure to obtain the same power load or indicated horse power:

1. By increasing the initial pressure with the same cut-off.
2. By lengthening the cut-off, with the same initial pressure.
3. A combination of the above methods.
4. By increasing the revolutions of the engine.

The last method is usually out of the question, due to the fact that constant speeds are generally obligatory, especially if operating electrical machinery. If the back pressure is too great the engine speed and capacity will be reduced and will require an increase in the initial pressure. The engine overload is generally indicated by a reduction in speed.

In the following discussion the additional cost of lengthening the cut-off will be deduced. Also the cost due to raising the initial pressure sufficiently to overcome the back pressure in the heating system. If an engine exhausts to atmosphere, with a back pressure of more than 16 lbs. absolute or 1 lb. above atmosphere, there is something inherently wrong with the piping or valve setting.

The amount of increase will be calculated for 5 lbs. back pressure or 20 lbs. absolute and 10 lbs. back pressure or 25 lbs. absolute. The engine exhaust will be figured with 16 lbs. absolute, when open to the atmosphere.

In this discussion it is unnecessary to consider the area of the cylinder, length of stroke or number of revolutions, as these will be constant for all conditions under consideration for the same indicated horse power. It therefore becomes necessary to calculate the number of expansions, which is dependent on the clearance and cut-off. The cut-off is the reciprocal of the number of expansions. The mean effective pressure, due to the cut-off and back pressure, must also be determined.

The mean effective pressure is calculated by adding 1 to the Naperian log of the number of expansions and dividing by the number of expansions. The quotient, multiplied by the initial absolute pressure is the mean effective pressure. The clearance will be assumed at 0.05 of the stroke and the cut-off at 0.25 for the load under consideration.

The true number of expansions will be

$$\frac{1 + \%\ \text{clearance}}{\text{Cut-off} + \%\ \text{clearance}} = \text{true number of expansions.}$$

A mean effective pressure will be calculated for 100 lbs. gauge, or 115 lbs. absolute, initial, with 16 lbs. absolute back pressure for the engine exhausting to atmosphere.

The number of expansions for 0.25 cut-off is 4. The true number of expansions, involving the clearance, will be $(1+0.05) \div (0.25 + 0.05) = 3.5$. $[(1 + \text{Log. e } 3.5) \div 3.5 \times 115 \text{ lbs.}] - 16 \text{ lbs.}) = 58$ lbs. M. E. P. $(1 + \text{Log. e } 3.5) \div 3.5 = 0.6437$.

The initial pressure will have to be raised as follows for a back pressure of 20 lbs. absolute to still give 58 lbs. net M. E. P.: $58 + 20 = 78$ lbs. M.E.P. to overcome back pressure 20 lbs. The factor, due to the number of expansions, which will remain the same, is 0.6437. $78 \div 0.6437 = 121$ lbs. absolute, or 106 lbs. gauge, to overcome 5 lbs. gauge back pressure, or 6 lbs.

have to be added to overcome an additional 4 lbs. back pressure, or 50% more than the back pressure.

If a back pressure of 25 lbs. absolute was required the initial pressure would be 58 + 25 = 83 lbs. M.E.P. to overcome 10 lbs. gauge back pressure. 83 ÷ 0.6437 = 129 lbs. absolute for 10 lbs. back pressure or 114 lbs. gauge.

The increase is 14 lbs. pressure for an increase of 9 lbs. in back pressure over atmospheric exhaust.

If the feed water is 210° F., the increase in heat per pound of steam for the different pressures will be as follows:

Total heat steam at 129 lbs. absolute	1,190.8
Total heat liquid at 210° F.	178
Heat required per pound of steam at lbs in B.T.U.	1,012
Total heat of steam at 121 lbs. absolute	1,189.6
Total heat liquid at 210° F.	178
Heat required per pound of steam at 121 lbs. absolute in B.T.U.	1,011.6
Total heat in steam at 115 lbs. absolute	1,189
Heat in liquid at 210° F.	178
Heat required per pound of steam at 115 lbs. absolute in B.T.U.	1,011

It is readily seen that the increase in heat per pound is less than 0.1 of 1% for the greatest increase in pressure and it is probably for this reason that the statement is made that the cost of raising the pressure to overcome the heating back pressure is negligible. This is so per pound of steam, but not per cubic foot. As the reciprocating engine operates on volumes and the volume decreases rapidly for an increase in pressure, the higher initial pressure will require a greater weight of steam for the same volume.

The increase in steam will be as follows:

Weight per cubic foot of steam at 129 lbs. absolute	0.2875
Weight per cubic foot of steam at 115 lbs. absolute	0.2577
Difference for same volume, per cubic foot	0.0298
Weight per cubic foot steam at 121 lbs. absolute	0.2705
Weight per cubic foot of steam at 115 lbs. absolute	0.2577
Difference for same volume, per cubic foot	0.0128

The increase in steam consumption for 16 lbs. back pressure is 289 ÷ 2577 = 16%.

The increase in steam for 16 lbs. back pressure over atmospheric, for the conditions named, is 298÷2577=11.6% increase.

If the cut-off on the engine is varied to overcome the back pressure, due to heating, with the same initial pressure, with 115 lbs. absolute the ratio of expansion will be as follows:

With the same initial pressure and the same net M.E.P. pressure, the factor changes from 0.6437. To obtain the new factor for 78 lbs. gross M.E.P., divide 115 into 78, which equals 0.6782, instead of 0.6437. By trial and error we find that Log. e of 3.18+1, divided by 3.18, gives 0.6782 or (1+1.1569)÷3.18=(0.6782×115)—20=58 M.E.P.

The cut-off, without clearance, will be

$$x = \frac{1.05 - (3.18 \times 0.05)}{3.18} = 0.28$$ instead of [0.25 at atmospheric.

The actual increase in steam will be as the ratios of expansion or 3.5 ÷ 3.18 = 110% or 10% increase in steam. If the back pressure is 10 lbs. gauge, instead of 5 lbs., the total M.E.P. will be 58+25=83 gross M.E.P. The factor will be as before 83 ÷ 115 = 0.7217. Log. e+1, divided by 2.82 will give factor 0.7217. The cut-off, without the 5% clearance will be:

$$x = \frac{1.05 - (2.82 \times 0.05)}{2.82} = 0.323,$$ or about [one-third stroke.

The increase in steam consumption will be, as before, 3.5 ÷ 2.82 = 1.24, or about 25% for increasing the cut-off to provide for 10 lbs. gauge back pressure.

The foregoing shows that exhaust steam heating is not obtained for nothing, although the most economical method is to raise the initial pressure. Five lbs. by the first method requires 5% increase and, by increasing the cut-off, 10% increase.

Ten lbs. by increasing initial pressure 11.6%, and, by lengthening the cut-off, 25%.

In most cases the variable back pressure required to meet outside heating conditions would make varying the boiler pressure inconvenient. The boiler pressure is carried nearly constant and the varying back pressure met by the cut-off which would give the expense due to the varying cut-off.

If the engine is not too lightly loaded the higher steam pressure would reduce the cut-off and make for greater economy when exhausting to atmosphere. There are times when the heating system will require the extra steam, due to higher back pressure, but the increased cost of power should be charged to the heating.

There are many non-condensing plants

furnishing lighting with district heating systems where the heating system requires only about 2 lbs. of coal per kilowatt in addition to the power load and the district heating advocates can show good results. Many of these plants are being reduced to sub-stations for high tension lines from a turbine condensing plant located at a distance.

If the heating and power required 10 lbs. of coal per kilowatt hour and power alone 8 lbs. per kilowatt hour of current produced and the engine on the local plant were only operated on the heating, the cost of heating would increase about four times and practically live steam prices for consumers would have to be obtained to make the heating plant pay.

The writer has one case of this kind in mind where 10 lbs. of coal were used for heating and power and 8 lbs. for current alone, and current is now delivered at less than 3 lbs. per kilowatt hour. This means that the entire up-keep of the heating plant, including engines, boilers, firemen, and engineers has to be charged to heating and the cost of fuel charged to heating is 7 lbs. as against 2 lbs. or 3½ times what it was before the high tension line was installed.

There is one way of meeting this new condition and that is by the use of hot water, where possible, on condensing turbines that can be operated under vacuum with fair economy at all times. As turbines and plant machinery become more economical in operation, the nearer the district heating plant will be to a live steam proposition with the entire equipment charged to the heating. Correspondingly higher rates will have to be obtained, however, to meet the new conditions.

This condition in time will possibly change the by-product steam plants into high pressure steam plants with no power. The extra capacity and reduction in relative condensation losses as compared with those at lower pressures may make up in a measure for the advantages of the modern condensing equipment over the by-product plant when non-condensing.

The increased revenue due to the greater capacity at higher pressures will decrease the proportionate charge for interest and depreciation on underground mains.

New Revised and Enlarged Edition of "Mechanical Equipment of Federal Buildings," Ready November 1.

A revised, rewritten and enlarged edition is announced of Nelson S. Thompson's "Mechanical Equipment of Federal Buildings." Over 100 pages of new reading matter have been added, making practically a new treatment of this important work. The book as revised by Mr. Thompson, who is chief mechanical and electrical engineer in the office of the Supervising Architect, Treasury Department, Washington, D. C., contains all of the basic data used in the design of mechanical equipments of Federal buildings under the control of the Treasury Department. In this third edition this matter has been revised, amplified and extended to include two especially valuable chapters, one on "Operating Data of the Larger Federal Buildings" and another on "Small Refrigerated Drinking Water Plants." The data given for estimating the cost of the mechanical equipment of Federal buildings have also been extended and brought up to date.

The book in its new form will make a wider appeal to heating engineers and contractors, as well as to architects and practical engineers, on account of the fact that the information has been digested and is in available form for use by busy men.

The revised edition contains over 400 pages, size, 6 x 9 in.; price, $3.00. Published by the Heating and Ventilating Magazine Co., 1123 Broadway, New York.

Book Reviews.

DISTRICT HEATING, devoted to the development and operation of central station heating and containing, among other things, heating rates in forty representative cities, is the title of a work that adds much to the published data on this subject. The authors are S. Morgan Bushnell and Fred. B. Orr. The first chapters are given over to the history of district heating, with maps showing a number of installations in the larger cities. It will readily be seen in glancing through the book that it is written from the viewpoint of the central station man and also that it gives special prominence to the advantages of low pressure steam heating. Stress is laid by the authors on the point that hot water heating systems are not well adapted to central station heating work, due to the difficulty of selling heat by meter rates. There is, of course, the additional reason of the cost of changing the steam radiation in existing installations to that of the hot water type.

There is not, however, the same objection to a flat rate on a hot water system properly designed as there is with a steam system, inasmuch as the steam system operates at a constant pressure and temperature, while the water system is capable of a wide variation in temperature, with control at the plant. Steam frequently necessitates intermittent operation to keep the expense down,

while water may operate continuously without excessive cost. Another point to remember is that the lower temperatures available on the water system admit of far greater recovery of power in the use of exhaust steam as compared with steam systems at higher back pressures. Due to the use of high tension lines for electric transmission and condensing turbines of large capacity and extremely low steam rate, it may well be asked whether the by-product heating plants are not being placed more and more at a disadvantage. The extra cost of the equipment for the use of exhaust steam and reduction in capacity of the system due to its use will hardly compensate for the saving in the use of exhaust steam over live steam for heating.

Two solutions of the problem suggest themselves. One involves the use of hot water with low temperatures under a partial vacuum, in connection with the large machines; the other, the changing of the exhaust system to a higher pressure live steam system, with the installation of reducing pressure valves and with proper rates for the service. Experience has shown that the live steam system will pay on a rate of 50 cents per 1,000 lbs. of steam or over.

Where electric current is made for 3 lbs. of fuel per kilowatt hour and only 1 kilowatt is recovered from about 10 lbs. to 15 lbs. of fuel used for heating, the cost of maintenance of the engine equipment for obtaining the power in this manner is apt to counterbalance all the extra revenue from the recovered power. On the other hand, where a by-product plant is already in operation at 5 to 20 lbs. back pressure and the pressure is raised to 50 to 80 lbs. with no exhaust steam, the capacity of the mains is doubled and the increase in revenue may make live steam operation more advantageous. The loss in mains in proportion to steam sold will be greatly reduced.

In one of the chapters the advantages and disadvantages of steam and water are set forth as distinctly in favor of steam. It may be mentioned, however, that a saving in the condensation and the use of a vacuum system on a water system may outweigh the advantage of the lower steam pressure. One is a large advantage in operating cost and the other is one of engineering construction simply.

The statement is made in one chapter that hot water heating requires 50% more radiation than steam. If the water is used at the same temperature as the steam, which is quite feasible, this, of course, would not hold. A number of hot water heating plants are operating at 220° to 260° F. in extreme weather. As a rule, however, hot water plants are generally operated at a lower temperature than steam, so as to obtain the advantage of the lower terminal exhaust steam pressure, which is impossible in the ordinary steam system.

In discussing friction losses, the authors state that the friction loss on a hot water system is much greater than on a steam system and that the mechanical work is returned to the system in heat in both cases. This may be questioned. The loss in a hot water system due to pumpage is simply live steam operation if the exhaust is used to heat the water. The loss in radiation in many steam systems operating under 5 lbs. pressure is considerably greater than on a two-pipe water system and the least loss in district heating systems will be on a high pressure live steam system on one pipe. The friction head only should not be taken into consideration, as if the same capacity in heat units is considered the weight in water by the possible drop as against the cubic feet of steam with its volume and latent heat, will give a smaller main for the water for the same B.T.U. capacity.

The chapter on meters is excellent, giving complete descriptions as to methods of construction and theory of operation. Also noteworthy is the coal-purchasing information contained in Chapter V. Size 6 x 9 in. Pp. 290. Price $3.00. Published by the Heating and Ventilating Magazine Co.

POWER, HEATING AND VENTILATION, by Charles L. Hubbard, is a series of three volumes devoted to the design, construction and management of power and heating plants. The volume on "Heating and Ventilating Plants," like the other two, is described as a treatise for students and a reference book for engineers. Without considerable research and trouble it would be difficult to check the many formulas given by the author, as, in most cases, only results are given by substitution in an arbitrary formula. It is, of course, unnecessary to say that the mechanical work of substitution in formulas gives a student little or no knowledge or insight into the reasons for using the factors.

The arrangement of the data is good, though the data, as far as can be observed, are a compilation rather than a new presentation. In his chapter on direct steam heating the author states that water heating requires larger radiators than steam heating. In these days of vapor systems and rapid circulation hot water systems it depends on the conditions, as water or steam may be operated at the same temperature. The radiation is proportioned solely by the temperature of the heating medium.

Though not a matter of importance. it is a little unfortunate that an abridged steam table is presented that is considered by most engineers as out-of-date, since all modern works recognize the Marks and Davis steam tables as standard.

In the chapter on indirect radiation we come to an example of the use of arbitrary formulas. The figuring of indirect radiation by the methods indicated might serve for less important work, but would be liable to lead to error in fan blast work. Pipe sizes for indirect radiation should really be based on pounds of steam rather than on square feet of radiation on account of the varying conditions under which air is used for heating and ventilating.

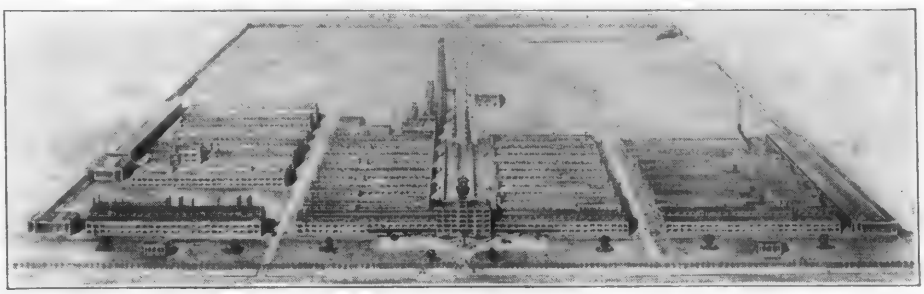
In the chapter on forced hot water circulation we again find arbitrary formulas which might not apply on large work. Size 6 x 9 in. Pp. 308. 207 ills. Price $2.50. Published by the McGraw-Hill Book Co., 239 West 39th Street, New York, and may be had through the book department of THE HEATING AND VENTILATING MAGAZINE.

New Publications.

TRANSACTIONS OF THE AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, Vol. VII, 1914, have been published in the name of the Institute by the D. Van Nostrand Co., 25 Park Place, New York, and may be had at $6.00 net. One of the principal papers in this volume is that on "Ozone in Ventilation," by J. C. Olsen and William H. Ulrich. This paper was published in part in THE HEATING AND VENTILATING MAGAZINE for July, 1914. Size 6 x 9 in. Pp. 308.

New Plant of Crane Company.

The accompanying illustration shows the extent of the new $10,000,000 group of factory buildings which will comprise the plant of the Crane Company, at Corwith, Chicago. As stated last month, the new plant will embrace 49 buildings, of steel and reinforced concrete construction, having an aggregate space of 50 acres. One of the typical buildings is a two-story structure, 500 ft. long and 80 ft. wide. The works office building is distinguished by its clock dial which is 15 ft. in diameter, with four faces and illuminated. Hot water under forced circulation will be used to heat the entire plant.



NEW PLANT OF CRANE CO. AT CORWITH, CHICAGO.

NEW DEVICES

Sims Gas Engine Economizer.

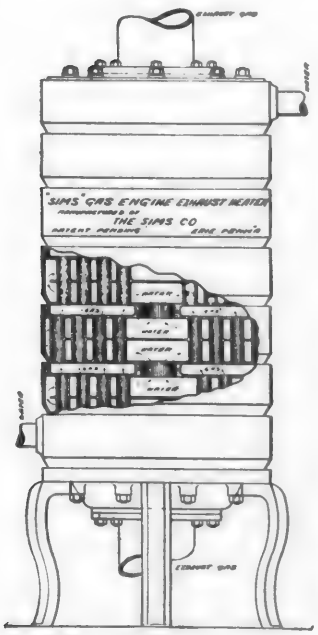
In most plants using gas engine power a boiler is necessary to furnish heat either through the medium of hot water or steam. This boiler must be ready for service whenever heat is required. An installation of a gas engine economizer would result in making use of waste heat in the exhaust gases, using a steam boiler as the water and steam storage. There is also a considerable portion of time in the late spring and early fall when heat is required only during the day and sometimes only in the office portion of a building. At such times the economizer may be able to furnish sufficient steam to take care of the service without any assistance from the boiler. On the other hand, when it is necessary to maintain a fire under the boiler the service obtained from the economizer would keep down to a minimum the amount of fuel required and thus effect a considerable saving.

As a result of these considerations, the Sims Company of Erie, Pa., has placed on the market an interesting apparatus, known as the Sims Gas Engine Economizer. This heater is made entirely of cast iron in round sections. Passages for the exhaust gases are provided in each section of ample area to avoid back pressure on the engine. The sections are built up in number and

size according to the horsepower of the engine in service. In a circular illustrating and describing the heater a number of illustrations are included showing how the economizer may be connected to secure different results.

The company publishes a noteworthy table showing the amount of available heat units that can be converted into hot water or steam, the amount being dependent on the thermal efficiency of the engine:

Thermal efficiency of engine, per cent...	15	20	25
Jacket water, per cent.	50	40	30
Exhaust gas and radiation, per cent...	35	40	45
	100	100	100



CONSTRUCTION OF SIMS GAS ENGINE ECONOMIZER.

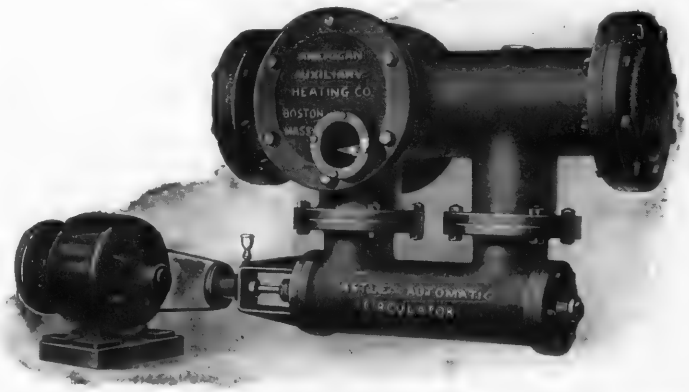
B.T.U. per 1 H.P. per hour	16,967	12,725	10,180
Utilized in engine..	2,545	2,545	2,545
Jacket water	8,483	5,090	3,054
Exhaust gases and radiation	5,939	5,090	4,581

The average amount of steam at 212° F. using exhaust gases only and supplying the boiler with jacket water at 120° is approximately 5 lbs. per horsepower per hour. The average amount of steam at 212° F. using the combined waste heat of jacket and exhaust gases is from 9 to 12 lbs.

When producing steam from both the jacket and exhaust gases, a circulating pump of high efficiency must be used, passing large volumes of water through the jacket to guard against burning the cylinder. The jacket space must also be free of fins and spuds. Engine builders do not recommend producing more than 5 lbs. of steam in an installation of this kind. On account of the variable thermal efficiencies of engines, operating conditions and fuel values, it is impossible to guarantee absolutely the results that can be secured. The amount of heating surface in a Sims economizer is figured to secure the best results on an installation of average thermal efficiencies and at a reasonable cost price.

Castle Circulator.

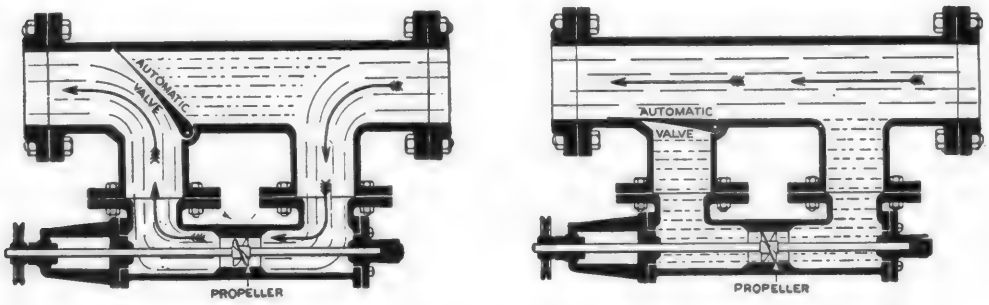
The Castle Circulator, described as a mechanical contrivance operated by means of a motor, gas engine or water power, for the purpose of producing or increasing the velocity of circulation in any kind of a hot water system, has been placed on the market by the Molby Boiler Co., Inc., 39-41 Cortlandt Street, New York. This device acts to produce a positive circulation



CASTLE AUTOMATIC CIRCULATOR FOR HOT WATER HEATING SYSTEMS.

through the entire plant and is so arranged as not to retard circulation when the power is shut off. It is especially useful in forcing circulation where the mains are so nearly level that they are sluggish, as a gravity main. It will also circulate positively radiation below the level of the heater, where results are often unsatisfactory. Where a radiator is located below the water line of a steam boiler it has been found possible to use this device in circulating the water through such radiator, making it possible to heat a room on the boiler level.

Other points mentioned for the Castle circulator are that it acts as an insurance



Circulator in Operation — Circulator "Cut Out"

CONSTRUCTION AND OPERATION OF CASTLE AUTOMATIC CIRCULATOR.

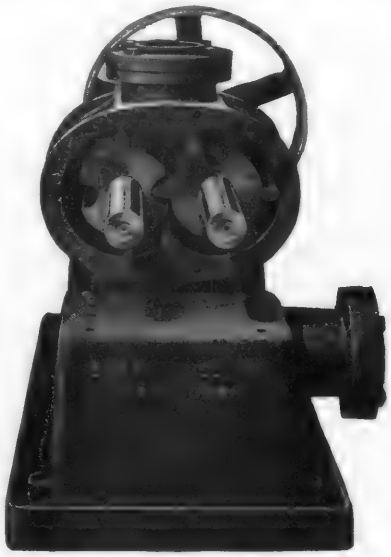
against freezing, that it produces an even temperature throughout a heating system and reduces the drop in a hot water system through the rapid circulation to 5° to 8°, as against 18° to 30°. In case of sudden drops in temperature, the circulator can be started to take care of the lower temperature without waiting for a slow fire to bring the temperature to the required point.

Another interesting feature is that the circulator does not put extra pressure on the system. Its operating cost is stated to be quite low, while it is estimated that the saving in fuel will soon pay for the cost of the device.

Trade Literature.

MODIFIED SYSTEM FOR ESTIMATING RADIATION, by Carleton F. Tweed, containing practical working rules, with tables, for using the common heat unit method, originally published in *The Practical Engineer,* has been reprinted in circular form by the Dole Valve Company, Chicago. This system includes allowances for such factors as difference in altitude, differences in temperature between the radiator and the room, and differences in the heights and widths of radiators. The use of the system is illustrated in a typical case where it is used to figure the radiation for the first floor as shown in a given plan. Alternate pages of the pamphlet are devoted to illustrated descriptions, together with roughing in dimensions of the Dole packless valves. The statement is made that 250,000 of these valves are now in successful use. Size 9 x 6 in. Pp. 20.

BEACH-RUSS VACUUM PUMPS, designed to satisfactorily meet the requirements for vacuum heating systems, are the subject of new circular matter calling attention to the important features of construction of this pump, which is manufactured by the Beach-Russ Company, 220 Broadway, New York. The pump may be arranged to suit various conditions in connection with return line vacuum heating systems, and the company is prepared to furnish blueprints showing such arrangement. In operation the pump constantly withdraws the condensation and air from the radiators in a building. It also is designed to separate the air from the water and to return the condensation to the boiler under 10 lbs.

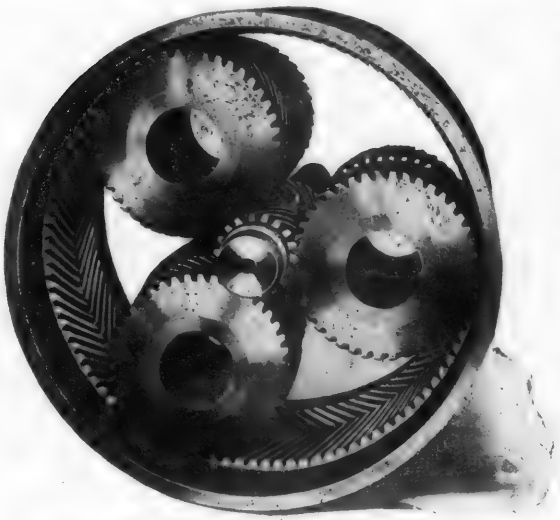


BEACH-RUSS VACUUM PUMPS FOR VACUUM HEATING WORK.

pressure, or the condensation can be discharged into a receiving tank and thence into the boiler, as conditions permit. Special attention is called by the manufacturers to the wearing qualities of the Beach-Russ vacuum pumps which are fully guaranteed to perform their duties satisfactorily. A point is also made of the fact that the pump can be applied to either new or old steam heating plants of any capacity, whether supplied from a boiler or from a central station heating plant. The pump

may also be used for heating with exhaust steam from an engine, without back pressure. As the pumps have no intricate parts, there is little to wear out, reducing the repairs to a minimum. The Beach-Russ Company has manufactured vacuum pumps for the past 20 years which is presented as an indication of the company's reliability and knowledge of this field. The company's full line includes also air line vacuum pumps for Paul air line vacuum systems, and water and liquid pumps; several sizes of condensation receivers and complete pump outfits; also thirteen sizes of rotary pressure blowers, which will operate against a head of from 1 to 12 lbs.

THE TURBO-GEAR, for use either as a speed reducing or speed increasing gear, which will run either right or left hand with the same efficiency, is described in a new circular, issued by the Turbo Gear Co., Industrial Building, Baltimore, Md. The driving and the driven shaft of this speed transformer rotate in the same direction. They are being made in seven different standard speed ratios. The manufacturers call especial attention to the adaptability of this gear to high-speed elec-



THE TURBO GEAR. FOR INCREASING OR REDUCING SPEED OF ELECTRIC MOTORS, AND OTHER APPARATUS.

tric motors, whereby the right speed may be obtained without the use of sprockets and chains, pulleys and belts, extra shafting and bearing, etc. It is also sometimes necessary to increase the speed when using steam, gas or oil engines for driving high-speed machines, such as centrifugal pumps, blowers, etc., and it is stated that the turbo-gear is equally efficient in this case.

MOREHEAD BACK TO BOILER SYSTEM OF STEAM DRAINAGE AND BOILER FEEDING is a carefully-prepared and attractive catalogue devoted to the Morehead tilting steam traps, return, non-return, vacuum and condenser, manufactured by the Morehead Mfg. Co., Detroit, Mich. The descriptive matter is accompanied by data on typical installations, as indicated on temperature recording charts, showing the fuel savings that have been achieved. There is also much special information, such as an explanation of the necessity for using the Morehead back-to-boiler system even though the boiler is below the heating system, and advantages of the Morehead system on one pipe heating systems. The remainder of the catalogue is devoted to a variety of power plant installations equipped with Morehead traps, accompanied, in many cases, with testimonial letters expressing the satisfaction of Morehead users. Size 6 x 9 in. (standard). Pp. 64.

NATIONAL BULLETIN, No. 20, issued by the National Tube Co., Pittsburgh, contains an index for National Bulletins Nos. 1 to 20. These bulletins, as indicated by the index, contain exhaustive pipe information which is now made readily accessible to the busy man, whether contractor, dealer, or consumer. The last pages of Bulletin No. 20 contain a summary of the preceding bulletins, those of special interest to the heating trade being No. 2 on "Corrosion of Hot Water Piping in Bath Houses," No. 3 on "The Durability of Welded Pipe in Service," No. 6 on "Pipe Threading Dies," No. 10 on "Relative Corrosion of Iron and Steel Pipe as Found in Service," No. 11 on "History, Characteristics and the Advantages of National Pipe," No. 12 on "Characteristics of National Pipe," and No. 80 on "List of Products."

LEA-COURTENAY CENTRIFUGAL PUMPS, made by the Lea-Courtenay Co., Newark, N. J., are presented in an engineering catalogue in which detailed information regarding this type of pump is supplemented by a quantity of data regarding turbine pumps in general and other pump data. The matter is divided into chapters, one chapter being devoted to the "Necessity of an Efficient Testing Plant." Other chapters take up Lea-Courtenay single-stage pumps for low and moderate heads, single-suction multi-stage pumps, balanced pumps and double-suction multi-stage pumps. There is also a chapter on Lea-Courtenay back-to-back pumps for boiler feeding, one on vertical multi-stage pumps, one on underwriters' fire pumps, and a final chapter (Chapter XII) on Lea-Courtenay portable sinking pumps. Size 6 x 9 in. (standard). Pp. 64.

POSITIVE AIR RETURN SYSTEM, including street steam systems, atmospheric systems, back pressure systems and vapor systems, sold by the Positive Differential System Company,

New York, are discussed in a new catalogue issued by this company. Attention is called at the beginning of the catalogue to the recent developments in the design of steam heating systems which have divided them into two distinct classes, air valve systems and air return systems. Air valve systems are described as those which require an air valve upon each radiator, while air return systems are those in which the air is carried down the return pipe, together with the return water, and discharged in the basement or boiler room. Where the steam is circulated at a pressure only slightly above that of the atmosphere, the air is usually forced out through a vent pipe or an air valve. Where the steam is at atmospheric pressure, or slightly below, the air is usually withdrawn by a vacuum pump. The two systems are further distinguished by the fact that in an air valve system it is always necessary to have the controlling valves of the radiators either entirely open, thus heating the unit completely, or else have them tightly closed. Any intermediate position of the valves results in the accumulation of water in the radiators. This causes water hammer, and perhaps the lowering of the water in the boiler to a dangerous point. In the air return system, on the other hand, the fractional valve upon the inlet of the radiator may be so adjusted that any desired amount of steam may be admitted, thus partially heating the radiator in proper relation to the outside weather, so that any preferred temperature of the room may be maintained. The catalogue then takes up the devices used with the Positive air return system, including the fractional valve, the impulse valve to control the flow of water and steam from the radiator, and the thermo-float air valve which closes against the passage of either water or steam. It is stated that a plant equipped with these devices will retain all the advantages of the ordinary one or two-pipe gravity system, in that it can be operated at any pressure, while it eliminates all air valves from radiators and does away with the necessity of having radiator valves either fully open or tightly closed. A number of buildings are shown which are equipped with Positive air return systems and, in addition, a list is given of some of the company's large and smaller installations. Size 6 x 9 in. (standard). Pp. 16.

BETSON'S PLASTIC FIRE BRICK, for making right in place jointless one-piece boiler furnace linings, including door arches and whole firebox fronts, entire side walls, bridge and back arch and baffles, together with instructions for using same, are the subject of a 20-page booklet published by the Betson Plastic Fire Brick Company, Rome, N. Y. The booklet also gives directions for the testing of boiler settings for air leaks and for the immediate repair, without shutdown, of cracks and holes to preserve the life of ordinary brick linings to the time when they can be replaced. Illustrations and diagrams show the one-piece lining as applied to the several types of boilers in general use. Size 4 x 9 in.

MARSH VALVES, including union bonnet double seat and special radiator double seat valves, made by the Marsh Valve Company, Erie, Pa., are the subject of new circulars just issued by this company. Special attention is called to four features: (1) That all Marsh valves contain an upper seal, formed by a composition disc and a finished metal seat in the bonnet, providing a positive seal against leakage around the stem when the valve is fully open; (2) that the company is prepared to furnish all the valves used in a heating system, including mill supply globe, angle and gate valves for piping jobs, and any style of union bonnet or special screwed bonnet radiator pattern, required for radiators; (3) that the discs of Marsh valves, both upper and lower, are manufactured by the B. F. Goodrich Company, Akron, O., and are guaranteed as to quality. The lower discs are of the oblong hole type, standard size, and interchange with all the high-grade makes. (4) That the Marsh union bonnet valves do not cost more than other high-grade valves and that the company's special radiator valves cost less, and but little more than low-priced competition lines. The company guarantees all of its valves. In specifying radiator valves, it is pointed out that a distinction should be made as to whether the union bonnet or the screwed bonnet pattern is desired. Size of circulars 3¾ x 6½ in. Pp. 16, 16 and 6, respectively.

PSYCHROMETRIC TABLES FOR COOLING TOWER WORK, being a companion book to "Steam Tables for Condenser Work," will shortly be published by the Wheeler Condenser & Engineering Co., Cartaret, N. J. Judging from the advance proofs, the booklet will be fully up to the standard of the advanced type of engineering trade publications which aim to be of real value to the engineer as well as to the manufacturer. This booklet really constitutes a handbook of tables giving dry and wet bulb thermometer readings, dew point, humidity and the pounds of water vapor per 1,000 cu. ft. and per 100 lbs. of air, together with a well-written discussion of psychrometry and the use of the sling psychrometer. The company's imprint states that it was the pioneer American condenser builder. Size 4 x 6¾ in. Pp. 50.

POWELL APPLIANCES, 1915, for automobiles, trucks, motorboats, gas, gasoline and oil engines, is the latest of a series of catalogues published by the Wm. Powell Company, Cin-

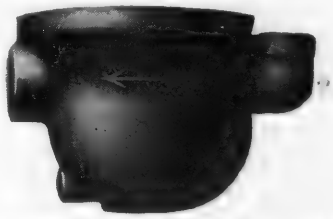
cinnati, O., well known as manufacturers of steam fittings and accessories of all kinds. For many years past the company has made a point of issuing at frequent intervals a series of booklets which not only illustrate the company's goods and list prices, but also give details and particulars not generally found in catalogues, thus obviating the necessity of writing the manufacturers for information. The company's line of "White Star" valves is prominently featured, and it is stated that the company is prepared at all times to furnish non-corrosive valves, cocks and fittings at special prices. Patrons are reminded that all articles bearing the Powell trade-mark are sold and guaranteed as to their mechanical perfection and superior workmanship. Size 5¼ x 7¾ in. Pp. 56.

VALVE WORLD for October, 1915, the monthly periodical of the Crane Company, Chicago, has an important article on "Pipe Bends—Their Growing Use and Efficacy," containing data and charts compiled by the mechanical expert's department of the Crane Company. This company has recently finished exhaustive tests with various types of bends in several sizes and weights of pipe to determine their relative value with regard to expansion and contraction. The results of these tests are given, while the charts include curves showing the expansion for bends placed in line without springing.

CONNERSVILLE VALVELESS ROTARY VACUUM PUMPS, for heating systems, vacuum cleaning, etc., are concisely treated in a circular published by the Connersville Blower Company, Connersville, Ind. The features of this pump which are especially mentioned are: no valves or valve ports, only two moving elements, no light or delicate parts, no internal contact or wear, no reciprocating motion, no reversals to limit speed and capacity, balanced at all speeds, minimum vibration, will handle air, gas, steam, water and all fluids; has six large bearings, ring-oiling type; furnished in all sizes and capacities, for all vacuums; and, finally, are a proven success.

MARSH SPECIAL OUNCE GRADUATION LOW PRESSURE RETARD GAUGES, for use on any low pressure boiler, is a recent product of Jas. P. Marsh & Co., Chicago, which is featured in new circular matter. This line includes pressure, compound pressure and vacuum gauges. The pressure gauge is for use on any low pressure boiler where the average pressure is to be recorded in ounces to 10 lbs. or less. The compound gauge is for use on the boiler of any low pressure, vapor or vacuum steam heating system where the average pressure to be recorded in ounces is 5 lbs. or less; also where the vacuum is to be recorded in ½-in. graduations to the depth of 10 in. These gauges, it is stated, may also be installed at desired points in the feed or return piping to indicate exact pressure in ounces or amounts of vacuum in ½-in. registrations at any location in the heating system. The gauge is furnished for all makes, styles and sizes of low pressure steam boilers. The list price, including cock, is $8.00 each. The same circular also features the Marsh special shank combined altitude gauge and thermometer for hot water boilers of closed or open systems, combining in one instrument an accurate altitude gauge and a reliable, protected thermometer. It is graduated to register any altitude of water up to 70 ft., while the thermometer and scale indicates any temperature from 40° to 240° F. The list price is $5.00 each.

JOHNS-MANVILLE STEAM TRAP, a recent product of the H. W. Johns-Manville Company, New York, is described in a newly-issued catalogue as the simplest trap made, comprising but three parts—the cover, body and rolling ball. The ball is the only movable part of



JOHNS-MANVILLE STEAM TRAP.

the complete device. The principle of operation is that the non-attached rolling ball is subject to a pressure equal at all points except that area resting against the discharge orifice. When condensation enters the trap through the inlet, the ball rolls up, exposing the discharge opening, which permits a discharge of water and air without any loss of steam. It is pointed out that this discharge is constant and automatic; also that the trap cannot air-bind, because the air, being heavier than steam and lighter than water, forms a film on the surface of the water and is carried out with it. While the condensation acts as a lifting force which is responsible for the outlet being uncovered, allowing the escape of water, air and other gases, the steam pressure simultaneously forces the ball to seat itself against the upper part of the opening with sufficient pressure to prevent any discharge of steam. Another feature mentioned is that the ball readapts itself to its seat automatically every time the trap discharges and is always kept clean. The Johns-Manville trap is made in five sizes, ranging in capacity from 750 sq. ft. of radiation to 10,000 sq. ft., and emphasis is laid on the statement that the trap capacities given are average and not the maximum capacity for the pipe size shown. Size 6 x 9 in. (standard). Pp. 8.

Panama-Pacific International Exposition.

7—AMERICAN RADIATOR COMPANY.

Three floor levels are employed by the American Radiator Company, Chicago, Ill., in their exhibit at the Panama-Pacific International Exposition, to demonstrate to the public the method of properly heating a home with American radiators and Ideal boilers; also for cleaning with Arco Wand vacuum cleaners. The entire arrangement of the exhibit, including decoration, furnishings, etc., is designed to give a homelike appearance to the display. The room is finished in white tile and the boilers are covered with white asbestos and have polished brass trimmings.

The company's display has won for it the award of the Grand Prize, which was also the award of this company at the previous world's expositions in Chicago, Paris, St. Louis and Brussels.

ENTRANCE TO EXHIBIT OF THE AMERICAN RADIATOR CO.

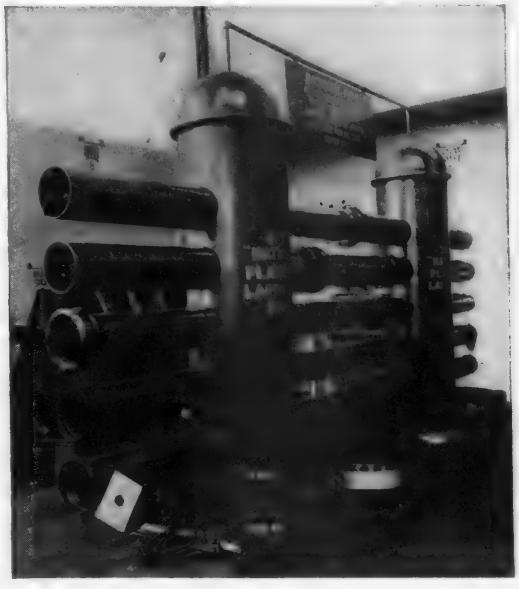
8—NATIONAL TUBE COMPANY.

A total floor area of 6,000 sq. ft. is occupied by the exhibit of the National Tube Company which is a part of the display of the United States Steel Corporation at the Panama-Pacific International Exposition. The exhibit is located in the Palace of Mines and Metallurgy. The products of the National Tube Company are National pipe and allied tubular products, Kewanee specialties, fittings, etc., and Shelby seamless tubing and cylinders.

MAIN DISPLAY OF THE AMERICAN RADIATOR COMPANY AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION, IN SAN FRANCISCO.

Entering the main section, the visitor walks through a large arch, 15 ft. in height, made of miscellaneous bends of 4-in. National pipe. Immediately behind this is a massive rack, on which are displayed the various types of National pipe used in the oil fields. Capping this rack is the largest and longest individual length of lap-welded wrought pipe ever made in America, consisting of one length of 20-in. O. D. National pipe, 39 ft. 6 in. long. This "double" length of National pipe was welded at the National works of the National Tube Company at McKeesport, Pa.

Probably the most commanding feature of the main booth is the colossal model, made to exact proportions, of a 2-in. octagon Kewanee union. Another exhibit shows freak specimens of casings which have encountered unusual and severe service. Further on are two large mahogany frames, with concealed electric lights, which enclose samples of corroded pipe, representing both wrought iron and steel. These samples show comparisons of the two kinds of pipe taken from the same line, used for the same service, and for the same length of time. The lines they were

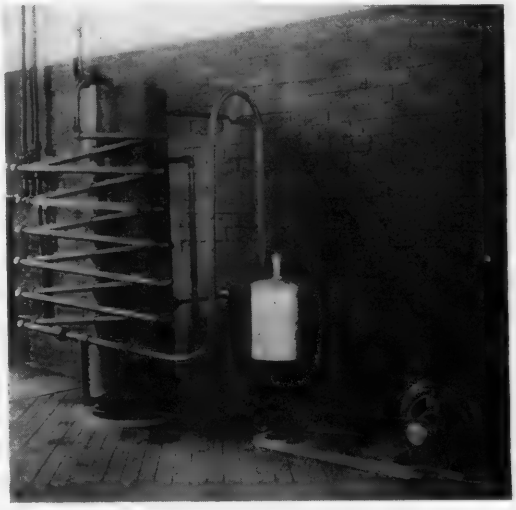


PART OF NATIONAL TUBE COMPANY'S EXHIBIT AT PANAMA-PACIFIC INTERNATIONAL EXPOSITION, SHOWING "NATIONAL" PIPE EQUIPPED WITH VARIOUS TYPES OF JOINTS; ALSO 30-IN. "NATIONAL" PIPE STANDARD.

taken from include feed water, heating and hot water lines.

In this connection a special apparatus is shown of an open heating system for making corrosion tests. This consists of a hot water tank, a water heater with thermostat, an air pump and several coils of pipe made of alternate lengths of wrought iron, ordinary steel and National pipe. Air is injected into the hot water which is forced up through these coils into the tank. The corrosion is quite rapid, as the service is severe, it being estimated that one month of this test is equivalent to one year in the average hot water line.

The tank is made of a piece of Matheson joint pipe in which a bottom has been



OPEN HEATING SYSTEM FOR CORROSION TESTS IN THE EXHIBIT OF THE NATIONAL TUBE COMPANY AT SAN FRANCISCO.

welded; the Lawson heater is used for keeping the water hot in the tank. There is also a blower or other source of air supply, and a test coil made up of alternate pieces of various pipes under test, with auxiliary fittings and a glass observation tube. The water is kept at a constant temperature by means of a thermostat controlling the gas supply. A thermostat is attached to the side to observe the temperature. The water is kept at a constant level by means of a ball cock attached to the outlet from a service line.

Tests are made by circulating the hot water from the tank through the coil by means of the air which is brought in at the bottom of the coil through an injector, which acts as an air lift for the water. By proper control of the air supply the water may be made to flow from the bottom of the tank through the coil and spill over the top into the tank at such a rate that there is just a gentle surging in

the pipes and the products of the corrosion are not stirred up with resultant coloration of the water. Under these conditions, circulation of the water will be at the rate of about 1½ gal. per minute.

Current Heating and Ventilating Literature.

Under this heading is published each month an index of the important articles on the subject of heating and ventilation that have appeared in the columns of our contemporaries. Copies of any of the journals containing the article mentioned may be obtained from THE HEATING AND VENTILATING MAGAZINE *on receipt of the stated price.*

AIR CLEANING—

Test for Dirt in an Air Supply. Sanford A. Mors. A new method of test. Ills. 1,800 w. Gen. Elec. Rev.—July, 1915. 40c.

HOT-WATER HEATING—

District Heating with Open Heater. Thomas Wilson. Privately owned electric plant at Laporte, Ind., using exhaust for hot-water heating. Ills. 2,000 w. Power—July 13, 1915. 20c.

PIPING—

Underground Pipe Mains for Steam and Hot-Water Heating. Charles L. Hubbard. How to design and install them. Ills. 2,000 w. Natl. Engr.—July, 1915. 20c.

SCHOOLHOUSES—

The Heating and Ventilation of Schoolhouses. Harold L. Alt. Methods giving greatest satisfaction. Ills. 2,500 w. Br. Build.—July, 1915. 60c.

ADVERTISERS' INDEX

	Page
Air Moistener Co., The	72
Alberger Heater Co.	64
American District Steam Co.,	Inside Back Cover
American Blower Co.	69
American Radiator Co.	Back Cover
Armstrong Mfg. Co.	57
Beach-Russ Co.	75
Bicalky Fan Co.	12
Bishop-Babcock-Becker Co.	58
Brennan & Co., John	7
Bristol Co., The	Front Cover
Buffalo Forge Co.	73
Buffalo Steam Pump Co.	5
Carrier Engineering Corporation	62
Century Ventilating Co.	66
Connersville Blower Co.	3
Davis Regulator Co., G. M.	80
Detroit Lubricator Co.	8
Dunham Co., C. A.	12
Foster Engineering Co.	6
Foxboro Co., The	59
Globe Ventilator Co.	Front Cover
Gurney Heater Mfg. Co.	Front Cover
Hornung, J. C.	81
Ilg Electric Ventilating Co.	4
Jenkins Bros.	59
Johns-Manville Co., H. W.	63 and 71
Johnson Service Co.	73
Kernchen Company	10
Knowles Mushroom Ventilator Co.,	Front Cover
Lavigne Mfg. Co.	81
Leonhard, Frederick	60
Marsh Co., Jas. P.	3
Michigan Pipe Co.	Front Cover
Molby Boiler Co., Inc.	Inside Front Cover
Mouat-Squires Co.	68
Mueller Mfg. Co., H.	80
National Air Cell Covering Co.	74
Parker Supply Co.	76
Patterson & Co., Frank	82
Powell Co., The Wm.	77
Pressed Metal Radiator Co.	9
Ric-Wil Underground Pipe Covering Co.	77
Ross Valve Co.	Front Cover
Sarco Engineering Co.	82
Savo Mfg. Co.	68
Scaife Sons Co., Wm. B.	77
Sims Co., The	75
Spencer Turbine Cleaner Co.	72
Standard Thermometer Co.	64
Standard Wood Pipe Co.	77
Sturtevant Co., B. F.	65-67-74
Syracuse Faucet & Valve Co.	8
Taylor Instrument Companies	70
United Vacuum Appliance Co.	10
Webster & Co., Warren	61
Wells & Newton Co.	60
Wyckoff & Sons Co., A.	72

TRADE AND MISCELLANEOUS NOTES

Coming Events.

October 20, 1915.—Annual meeting of the Eastern Supply Association in New York. Headquarters at the Hotel Astor.

October 27, 1915.—Annual meeting of the Central Supply Association, in Chicago, Ill. Headquarters at the Auditorium Hotel.

Deaths.

Edward Richards, a pioneer in the steam heating business, and for many years connected with Baker, Smith & Co., New York, died at his home in Scarsdale, N. Y., Sept. 12. He was 70 years old.

Frederick Barnd, senior member of the firm of Barnd & Geiger, Buffalo, N. Y., heating and ventilating engineers and contractors, died in that city September 13. He was 61 years old. Mr. Barnd had been connected with the trade since 1872, when he formed the heating and plumbing firm of Renrick & Barnd. When Mr. Geiger purchased the interest of Mr. Renrick in 1881, the firm name was changed to Barnd & Geiger.

Miscellaneous Notes.

Cleveland, O.—According to a resolution passed by the Cleveland Association of Master Steam and Hot Water Fitters, members of that association will refrain from bidding on the installation of mechanical heating and ventilating systems in buildings where more than ten radiators are to be installed, unless complete plans and specifications for the work are furnished. The principal reasons for the action, it was stated, are that certain architects and engineers, when calling for bids for installation of heating systems, furnish a heating contractor with general building drawings only, requiring the heating contractor to design a complete heating system containing all essential features, and also to prepare specifications.

On the average job there are about six different heating plans and specifications prepared, with only one set to be utilized. The heating contractors assert heating plans and specifications should be prepared by the architect or engineer on the work and, if prepared by the heating contractor, the latter should be remunerated.

Mount Vernon, Ia.—The project of building a central heating plant for Cornell College, is believed to be the beginning of a building enterprise that will include a new science hall. It is estimated that the erection and installation of the plant, for which plans have been drawn, will cost $75,000.

Wheeling, W. Va.—In order to make use of the intense heat generated in the warming furnaces of the United States Stamping Company's plant, which has been allowed to escape outdoors, large conductors have been so arranged as to pocket the heat generated in the furnaces. The heat will thus be used to warm the different shops of the plant in cold weather, effecting a very considerable saving.

Hanford, Cal.—A special tax of $8,000 has been voted to pay for the installation of a new heating plant and ventilating system for the Central School in Hanford.

M. W. Ehrlich, after 2½ years' service with Cole, Ives & Davidson, New York,

Genuine Armstrong Stocks and Dies

MALLEABLE HINGED PIPE VISES

PIPE CUTTERS

PIPE MACHINES, HAND OR POWER

The Tools of Constant Service

Manufactured by **Write for Catalog**

THE ARMSTRONG MFG. CO., 321 Knowlton St., BRIDGEPORT, CONN.

Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*

consulting engineers, has severed his connection with that firm to take up the duties of editing Electrical Engineering, a monthly periodical devoted to the field of electric practice. Mr. Ehrlich's headquarters will be at the offices of the Technical Journal Co., Suite 1642, Woolworth Building, New York.

American Foundrymen's Association and the American Institute of Metals held a joint convention at Atlantic City, Sept. 27 to Oct. 1. Headquarters were at the Traymore Hotel. No less than 30 technical papers were on the program, in addition to committee and other reports. At a banquet held at the Traymore Sept. 30, Dr. John A. Brashear, president of the American Society of Mechanical Engineers, delivered an address on "Personal Reminiscences of Fifty Years' Development in Mechanical Science."

Cincinnati, O.—A new smoke ordinance for Cincinnati was adopted Sept. 5 as an addition to Section 311 of the city code. It reads as follows: "Sec. 311-25. Where internally-fired steam or hot water boilers, or where hot air furnaces are to be installed for heating, the boiler or furnace shall be equipped with a down-draft underfeed, or other type of smokeless furnace in which the fresh fuel will not be thrown directly upon the hot fuel bed, and shall be approved by the Chief Smoke Inspector; except where the boiler is to furnish heat for buildings containing less than twelve hundred (1200) square feet of steam radiation, or less than two thousand (2000) square feet of hot water radiation, or, except where, in hot-air furnace installations, the total amount of grate surface, in all the furnaces combined, is less than nine (9) square feet, or except where the boiler or furnace is to be installed in a building intended only as a dwelling place for less than five (5) families."

Building Operations for August in 68 cities showed a gain of 14% as compared with the same period a year ago. The total was $60,113,453 as against $52,790,472 in August, 1914. This is also an increase over the figures for August, 1913. New York had a gain of 44%, Chicago 65%, and Philadelphia 51%. Other cities reporting gains were: Cincinnati, 170%; Dayton, 262%; East Orange, 93%; Hartford, 184%; Manchester, 51%; Memphis, 55%; Milwaukee, 59%; Portland, 78%; St. Paul, 65%; Spokane, 59%; Springfield, Ill., 50%; Syracuse, 57%; Toledo, 52%; Topeka, 227%; Troy, 61%; Utica, 172%. Among the cities reporting losses were Newark, N. J., 82%, Baltimore 56%, Louisville 52%, Pittsburgh

There's a little valve that is reliable!

IT'S a VacUstat, and is reliable in more ways than one—first of all it is reliable in the sense that you can depend on it to work right and perform its functions properly **always;** and again it is reliable because it is one of the RELIABLE Vacuum Heating Specialties.

VACUSTAT

TRADE MARK REG. U.S.PAT. OFF.

The VacUstat is a thermostatic valve, which automatically keeps the radiators, piping and boiler free from air, prevents escape of steam and insures quick, thorough and even heat circulation, by making every radiator fully efficient. The VacUstat has larger venting capacity, is entirely different and far superior to any other air valve. VacUstats are part of the RELIABLE Air Line Vacuum Heating Equipment, which is used to perfect steam heating plants and to save fuel. Being properly and permanently adjusted at our factory, VacUstats can be installed quickly and at unusually low cost, and after installing VacUstats it is not necessary to go back to the job to make other adjustments.

Install VacUstats—insist on using them—and both you and your customer will be perfectly satisfied with the results.

RELIABLE Heating Specialties—Electric and Hydraulic Vacuum Pumps, VacUstats, Vacu-Traps, Vacu-Graduate Packless Valves, "4-V" Valves, Vacu-Checks, etc.—are Standardized and Staple, and carried in stock by most representative jobbers.

The RELIABLE Heating Equipment catalog will interest you—write for a copy today! Ask for Booklet "K"

THE BISHOP-BABCOCK-BECKER CO.

General Offices, CLEVELAND, OHIO

New York Chicago Milwaukee Cincinnati St. Paul St. Louis San Francisco

34%, San Francisco 31%, Seattle 38% and Tacoma 61%.

National Association of Master Plumbers has moved its executive offices from Philadelphia to Cambridge, Mass., where it is located at 689 Massachusetts avenue, directly across the street from the office of President James S. Cassedy.

Erie, Pa.—Among the sufferers from the flood in Erie which wrecked a large portion of the city are the Jarecki Mfg. Co., whose stock of fittings were damaged to the extent of $200,000. The heating and plumbing firm of Scobel & Winston, on State street, had their quarters badly flooded, while the quarters of H. E. Volland were flooded and wrecked. The home of James Purcell was flooded and his garage destroyed. Edward Pfadt of the firm of Meyer & Pfadt suffered through the partial destruction of his home, which was newly furnished.

Seattle, Wash.—Bids will shortly be received by George W. Lawton, Alaska Building, for the heating and plumbing equipment of the $125,000 Masonic Temple on Harvard avenue and Pine street.

F. K. Davis, New York, formerly with the Chamberlin Metal Weather Strip Co., has associated himself with the New York office of the Consolidated Engineering Company, with headquarters at 104 Park Avenue, the New York office having recently moved to this address.

Central Station Heating Notes.

Iowa Falls, Ia.—The new heat and power company is rushing work on its plant with a view of having its heating system ready at the opening of the heating season. Many connections to buildings have already been made.

Mapleton, Minn.—At a special election the proposition to issue $9,000 in bonds to erect a central heating plant for the schools was carried. At a previous election last July the proposition failed by a few votes.

Saginaw, Mich.—A deal whereby the Saginaw Heating Company, established last summer and operated by Herbert F. Wills, of Logansport, Ind., becomes the property of the Consumers' Power Co., successor to the Saginaw Power Co., has been consummated by Vice-President John A. Cleveland of the latter company. The holdings of the heating plant will be taken over immediately by the new owners. J. D. Harris, manager of the heating system, continues as manager, but the offices will be removed from the plant at Baum Street and Janes Avenue to the offices of the power company on South Washington Avenue. Improvements are planned in the system for the betterment of the service and will include the addition of an electric generator. Work has been completed on the laying of new heating mains on North Baum Street, South Franklin Street and Janes Avenue.

Eveleth, Minn.—Construction and improvement work which has been carried on at an expense of about $75,000 by the Home Electric and Heating Company is now practically completed. The company has moved from its temporary offices to its new office building on Jackson Street.

Jenkins Bros. Hose End Valves

Particularly adapted to fire protection service because they are fitted with Jenkins Bros. Discs of soft flexible rubber composition, forming seat and making the valves absolutely tight under cold water pressures. The discs never stick nor corrode, and valves are at all times ready for instant service. Various styles. Write for catalogue No. 20.

JENKINS BROS.

New York Boston Philadelphia Chicago Montreal London

SPECIFY FOXBORO THERMOMETERS

TRADE MARK

SEE OUR EXHIBIT—PANAMA PACIFIC EXPOSITION

San Francisco, Cal., Palace of Machinery, Corner 3rd St. and Avenue C2

THE FOXBORO COMPANY Succeeding The Industrial Instrument Co.

New York Chicago FOXBORO, MASS., U. S. A. San Francisco St. Louis

The improvement work has included the rebuilding and enlarging of the plant at the west end of Jones Street. The new machinery installed includes a 150-K. W. generator and a 375-K. W. generator, both of which are connected up with a 500 H. P. engine. A 350 H. P. boiler, a 600 H. P. feed water heater and a 600 H. P. water weigher are also included in the equipment. The Eveleth high school and the manual training building have been connected to the heating plant during the summer and a large number of private residences have been added.

Little Rock, Ark.—The Little Rock Railway & Electric Co. has taken over the operation of the Central Heating & Mfg. Co., of which W. B. Brooks was president, Verne McMillan secretary and W. [illegible]. Tharp treasurer, with offices in the Southern Trust Building. Charles J. Griffith, general manager of the Little Rock Railway & Electric Co., in the reorganization of the company, was elected president and manager. The Central company has been engaged in furnishing steam heat in the downtown district, its mains extending only to Ninth and Main Streets. The Lit-

Patented

It Will Pay You to Investigate

The Leonhard Automatic Water Driven Air Exhauster

For Air Line Vacuum Heating Systems

CREATES and automatically maintains a vacuum in the air piping leading from air valves. Rapid, silent and uniform circulation of steam throughout entire radiation is procured, with the great expansion peculiar to vacuum space.

The Air Exhauster is very simple, has bronze diaphragms, no wearing parts, does not require packing, and will last a lifetime.

No experiment, but a tried and proven device. A postal will bring you full details.

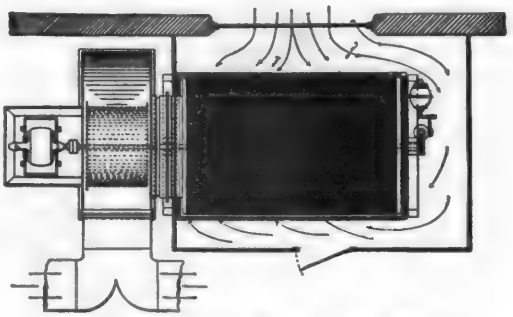
FREDERICK LEONHARD

536 East 123rd Street - - - CLEVELAND, OHIO

Kingwelton Talks No. 9.

KINGWELTON ROTARY AIR WASHERS

Are manufactured by us to fit any reasonable location and purify any desired volume of air. Upon request, we will gladly inspect any premises in which ventilation of this character is desired and will furnish estimate therefor.



(Patented August 13, 1912) **Plan View**

The Kingwelton operates at 1/10 of the cost of other air washers, while performing the same service. One revolution per minute requires but 1 H. P. per 50,000 cu. ft. of air supplied per minute. Other volumes in proportion.

Every Detail of Manufacture Has Our Personal Expert Supervision

Let us figure on your next installation

WELLS & NEWTON CO., Ave. B and 17th St., NEW YORK

Webster Air Conditioning Apparatus

Webster Air-Conditioning apparatus is constantly demonstrating its capacity, under a wide variety of exacting conditions, to effect and maintain any desired temperature and humidity.

Wherever a highly efficient and thoroughly dependable air-cooling or air-conditioning system is required, Webster apparatus, by reason of exclusive advantages, merits unquestioned consideration.

Widely installed in hotels, restaurants, office and administration buildings, as well as industrial establishments where special air-cooling and air-conditioning problems are to be met.

Our catalogues and engineering force are at your command.
We guarantee results.

WARREN WEBSTER & CO.

ESTABLISHED 1888

CAMDEN, N. J.

BRANCHES IN PRINCIPAL CITIES

tle Rock Railway & Electric Company will operate the plant as far as its mains extend and it is intimated that further extensions will be made at a later date.

Williston, N. D.—The entire section near Williston may be supplied with electricity from the Federal irrigation plant near that place, as a result of a proposal made by the Ray Commercial Club to the city of Williston. The proposition is that a high power transmission line be erected from Williston to Ray and that that city be supplied with power. Williston now has a contract with the government for power and under the plan now considered would retail power to the city of Ray at about 3 cents per kilowatt.

Columbia City, Ind.—On account of adverse weather conditions unavoidable delays were experienced in running the steam heating mains from the city power and water plant to the new school building which will be served with exhaust steam for heating purposes. The work, however, was completed in time for the opening of school.

Youngstown, O.—In the making of new valuations on public utility companies the State Tax Commission has ordered a $600 increase in the valuation of the Youngstown Heating Company. Last year the local company was given a valuation of $69,900, while the valuation this year is $70,500.

Cleveland, O.—Prohibitive cost of extending and enlarging its mains was given by officials of the Cleveland Illuminating Company as a reason for its refusal to accept an ordinance to furnish steam heat at present rates to the new city hall. The company outlined its position in a communication to the city council. Its refusal to accept the ordinance means that the city hall may have to do without heat, unless a settlement can be made with the company. Mayor Baker instructed the city law department to take the necessary steps to force the company to furnish heat. The company suggested that it be allowed to charge a sum sufficient to earn the interest and depreciation upon the cost of the new conduits or that the city build a line to connect with the company's Canal Road plant. It was pointed out by officials of the company that the city hall is located in territory covered by the Bradley Light, Heat & Power Co. The matter was referred to the State Public Utilities Commission.

Tacoma, Wash.—As a result of the action of the city council in authorizing a reduction of electric light rates to 1½ cents

CARRIER
Engineering Corporation
39 CORTLANDT STREET - NEW YORK

Specialist in Air Conditioning and Drying.

The Organization That Developed Air Conditioning.

Write us if your problem concerns humidifying, dehumidifying or the automatic control of either.

a kilowatt for office buildings of 200,000 cu. ft. or more, promoters of the Tacoma Central Heating Company announced that they were ready to go ahead with construction work as soon as the ordinance takes effect. It is proposed to spend between $200,000 and $250,000 in six months, beginning at once. In a statement by Manager Barnes, he stated:

"The heating of the downtown office buildings depends to a large extent on the facilities for lighting, also. We had to make contracts subject to the action of the city on the lighting question. We couldn't expect owners of buildings operating their own heating and light plants to buy the heat when they would have to operate the steam plants to provide electricity for lighting. Now that the city has offered to furnish the electric current at a rate lower than it can be produced by the small plants, there is no object in maintaining them.

"Although the business did not come at first as fast as we expected, we have contracts now for heating more than 20,000 000 cu. ft. of building space, which is enough to warrant us in going ahead. We expected to be doing business the first of September, but there have been several delays and we will not start until later. We will be able to cover the business district, which will be the extent of our operations the first year, in six months. We can put up the buildings while the underground work is being done."

The company has several sites in view, any of which can be obtained. One of the sites is near South 15th and Dock Streets, next to property owned by the city. It is desirable because of the fact that the city has a contract with the heating company for steam to operate an auxiliary electric power plant. The contract, which is made a condition of the franchise, requires the heating company to furnish steam for the operation of the plant whenever demand is made. The first unit the heating company will build will have a capacity of 4,000 horsepower.

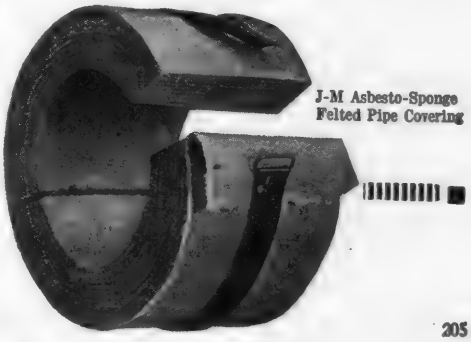
Davenport, Ia.—The directors of the Tri-City Railway & Light Company have approved estimates of General Manager H. C. Blackwell of the People's Light Company for the rebuilding of the downtown heating system at a cost of nearly $100,000. The directors decided to discontinue the heating business in Davenport if the city council should refuse the request of the company to tear up the streets and relay the mains. It was stated by B. J. Denman, assistant general manager of the United Light & Railway Companies, the parent corporation, that there is no profit in the heating business in Davenport on the pres-

The Increase in Heat Insulation Efficiency Is Best Measured by Decrease in Fuel Bills

This is the purpose and the effect of J-M Heat Insulation Service. But the Service goes further—not only furnishing pipe coverings **as good as they ought to be,** but applying them **as they should be applied.** There is a J-M Insulation for your particular problem, whether for superheated steam lines, high pressure, medium pressure and low pressure—cold water, ice water, brine and ammonia pipes and for lines exposed to the weather, these insulations are your assurance of a proper material regardless of conditions.

Your assurance of complete satisfaction is absolute, because this service accepts that obligation for all its work—work covering fifty years in the field.

H. W. JOHNS-MANVILLE CO.
New York and All Large Cities



J-M Asbesto-Sponge Felted Pipe Covering

205

tle Rock Railway & Electric Company will operate the plant as far as its mains extend and it is intimated that further extensions will be made at a later date.

Williston, N. D.—The entire section near Williston may be supplied with electricity from the Federal irrigation plant near that place, as a result of a proposal made by the Ray Commercial Club to the city of Williston. The proposition is that a high power transmission line be erected from Williston to Ray and that that city be supplied with power. Williston now has a contract with the government for power and under the plan now considered would retail power to the city of Ray at about 3 cents per kilowatt.

Columbia City, Ind.—On account of adverse weather conditions unavoidable delays were experienced in running the steam heating mains from the city power and water plant to the new school building which will be served with exhaust steam for heating purposes. The work, however, was completed in time for the opening of school.

Youngstown, O.—In the making of new valuations on public utility companies the State Tax Commission has ordered a $600 increase in the valuation of the Youngstown Heating Company. Last year the local company was given a valuation of $69,900, while the valuation this year is $70,500.

Cleveland, O.—Prohibitive cost of extending and enlarging its mains was given by officials of the Cleveland Illuminating Company as a reason for its refusal to accept an ordinance to furnish steam heat at present rates to the new city hall. The company outlined its position in a communication to the city council. Its refusal to accept the ordinance means that the city hall may have to do without heat, unless a settlement can be made with the company. Mayor Baker instructed the city law department to take the necessary steps to force the company to furnish heat. The company suggested that it be allowed to charge a sum sufficient to earn the interest and depreciation upon the cost of the new conduits or that the city build a line to connect with the company's Canal Road plant. It was pointed out by officials of the company that the city hall is located in territory covered by the Bradley Light, Heat & Power Co. The matter was referred to the State Public Utilities Commission.

Tacoma, Wash.—As a result of the action of the city council in authorizing a reduction of electric light rates to 1½ cents

CARRIER
Engineering Corporation
39 CORTLANDT STREET - NEW YORK

Specialist in Air Conditioning and Drying.

The Organization That Developed Air Conditioning.

Write us if your problem concerns humidifying, dehumidifying or the automatic control of either.

a kilowatt for office buildings of 200,000 cu. ft. or more, promoters of the Tacoma Central Heating Company announced that they were ready to go ahead with construction work as soon as the ordinance takes effect. It is proposed to spend between $200,000 and $250,000 in six months, beginning at once. In a statement by Manager Barnes, he stated:

"The heating of the downtown office buildings depends to a large extent on the facilities for lighting, also. We had to make contracts subject to the action of the city on the lighting question. We couldn't expect owners of buildings operating their own heating and light plants to buy the heat when they would have to operate the steam plants to provide electricity for lighting. Now that the city has offered to furnish the electric current at a rate lower than it can be produced by the small plants, there is no object in maintaining them.

"Although the business did not come at first as fast as we expected, we have contracts now for heating more than 20,000 000 cu. ft. of building space, which is enough to warrant us in going ahead. We expected to be doing business the first of September, but there have been several delays and we will not start until later. We will be able to cover the business district, which will be the extent of our operations the first year, in six months. We can put up the buildings while the underground work is being done."

The company has several sites in view, any of which can be obtained. One of the sites is near South 15th and Dock Streets, next to property owned by the city. It is desirable because of the fact that the city has a contract with the heating company for steam to operate an auxiliary electric power plant. The contract, which is made a condition of the franchise, requires the heating company to furnish steam for the operation of the plant whenever demand is made. The first unit the heating company will build will have a capacity of 4,000 horsepower.

Davenport, Ia.—The directors of the Tri-City Railway & Light Company have approved estimates of General Manager H. C. Blackwell of the People's Light Company for the rebuilding of the downtown heating system at a cost of nearly $100,000. The directors decided to discontinue the heating business in Davenport if the city council should refuse the request of the company to tear up the streets and relay the mains. It was stated by B. J. Denman, assistant general manager of the United Light & Railway Companies, the parent corporation, that there is no profit in the heating business in Davenport on the pres-

The Increase in Heat Insulation Efficiency Is Best Measured by Decrease in Fuel Bills

This is the purpose and the effect of J-M Heat Insulation Service. But the Service goes further—not only furnishing pipe coverings **as good as they ought to be,** but applying them **as they should be applied.** There is a J-M Insulation for your particular problem, whether for superheated steam lines, high pressure, medium pressure and low pressure—cold water, ice water, brine and ammonia pipes and for lines exposed to the weather, these insulations are your assurance of a proper material regardless of conditions.

Your assurance of complete satisfaction is absolute, because this service accepts that obligation for all its work—work covering fifty years in the field.

H. W. JOHNS-MANVILLE CO.
New York and All Large Cities

J-M Asbesto-Sponge Felted Pipe Covering

205

ent basis. The effect of the company's action, if it discontinues the heating business, would be serious, as practically all the downtown buildings would be forced to put in their own heating systems. The plans of General Manager Blackwell, which have been approved by the directors, call for the laying of 3½ miles of steam mains and 3 miles of service mains. If the city council approves the proposition, the company will spend $15,000 this fall in improving mains where they are now in a bad state of repair.

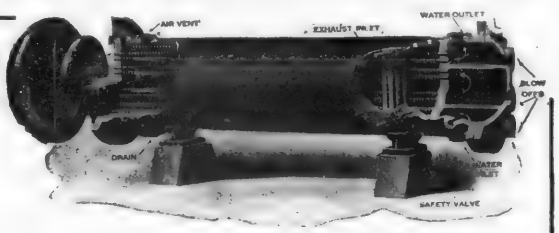
Ritzville, Wash.—The council has been asked to grant a franchise to the Ritzville Heating Company, to operate a central heating system at that place. The plan is to establish a central heating plant in the rear of the Koch & Dewald garage on C Street and to heat the various business houses within a radius of three blocks. Under the proposed franchise the company would pay the city 1% of the gross earnings. Provision is also made for the purchase of the heating plant by the city, if it so desires.

Des Moines, Ia.—The city council has passed the heating franchise submitted by the Des Moines Electric Company, the final action bing taken September 14. It also appointed a committee to investigate the charges of J. M. Price that Des Moines citizens are paying excessive rates for electricity. One item that delayed final action was the provision that the city could purchase the plant after twenty-four years. An amendment was finally presented by Attorney Charles Bradshaw, for the electric company, providing for purchase after eight years. Another objection was based on the fact that the Des Moines Electric Company is a Maine corporation. An effort was made to bring the company under the jurisdiction of the Iowa courts so that any litigation could be tried in the State courts. Councilman Myerly and Mayor Hanna agreed that the Federal court is a poor place for the city to litigate because of the long delays. It was also claimed that after a fight has been threshed out in the State court a "foreign" corporation, such as the electric company, could require the case to be fought over again in the Federal court because of its rights as a "foreign" corporation. No action was taken on this matter.

The franchise gives the Des Moines Electric Company the right for twenty-five years to operate a heating plant. The franchise provides that for the first eighteen years 8% a year shall not be considered an unreasonable return on the investment. It may be fixed otherwise by the legislature after that.

The following rates shall be in effect during the initial period of three years:

Correct Engineering Principles
are followed in the construction of the
ALBERGER MULTI-HEAD WATER HEATERS
Horizontal or Vertical



Proper provision is made for expansion and contraction of the tubes. Built of the highest grade materials, consisting of pure copper and cast-iron.

For boiler feed water, gravity and forced circulation heating systems, hot water service for domestic purposes, etc. Catalogue on request.

ALBERGER HEATER COMPANY, BUFFALO, N. Y.
CHICAGO, ILL.

Accurate Service Is Assured When You Use
Standard Indicating and Recording Thermometers
Guaranteed Correct

Full line includes seven types of recording thermometers and a special line for mechanical uses
Indicating mechanical thermometers are furnished with extensions from 2 to 30 in. in length
All thermometers are double and not breakable.
STANDARD THERMOMETER COMPANY Clinton and Shirley Streets **BOSTON, MASS**

9 Sturtevant (REG. U. S. PAT. OFF.) Copper Air Washers In Kansas City Terminal

Sturtevant Multivane Fan and Air Washer, Showing Motor-Driven Circulating Pump. Note glass inspection door.

The air washers in the Kansas City Union Terminal have a combined air capacity of 301,000 cu. ft. per minute. There are two units of capacity 45,000 CFM; three units, 38,000 CFM; two units, 33,000 CFM; one unit, 24,000 CFM; and one unit 14,000 CFM.

All the air washers were guaranteed to humidify to 95% saturation with air leaving the pre-heater at 45°. The required air cleansing efficiency was 98½%.

The air washers have glass doors and observation window, and water-proof electric lights, and they are supplied by motor-driven pumps with water-cooled bearing. They operate in connection with Sturtevant Multivane Fans, of which there are 26 in the building.

Let us send you a catalogue describing the Sturtevant Air Washer

B. F. Sturtevant Company, Hyde Park, Boston, Mass.
And All Principal Cities of the World

Eighty cents a month for first 20,000 lbs.
Seventy cents a month for next 20,000 lbs.
Sixty cents a month for next 60,000 lbs.
Fifty cents for next 100,000 lbs.

There shall be a readjustment of rates after that period and there may be other readjustments as it is found the rates can be lowered.

The ordinance must now go before the people for final approval. It will be voted up about Nov. 15.

Officers of the company indicated that preparations for building the system would be begun at an early date. They say $250,000 will have to be spent before the heating system is in shape to do business and that an expenditure of $500,000 will be made on it eventually.

Toledo, O.—The Citizens' Heating & Lighting Company has been authorized to extend its mains across Ontarion to furnish heat to the Public Library building, in that city.

Manufacturers' Notes.

South Chester Tube Co., Chester, Pa., announces, through its New York office, that it is now ready to fill orders for all sizes from ⅛ in. to 12 in., inclusive, of Chester strictly wrought iron full weight pipe. The company's new mill is in operation and it is stated that it is equipped with the most up-to-date methods for pipe making. The company's eastern sales manager is Thomas F. Cushing, with headquarters at 30 Church Street, New York.

Frank L. Patterson & Co., New York, report that in connection with the annual overhauling of hot water systems in colleges and universities, preparatory to the new school year, they have been furnishing a number of Patterson hot water heaters for heating water for various domestic services. Among the installations made this summer are the following: Vassar College, Poughkeepsie, N. Y.; Catholic University, Washington, D. C.; State College of Washington, Pullman, Wash.; Winthrop Normal and Industrial College, Rock Hill, S. C.; St. Michael's College, Hillyard, Wash.; Cornell University, Ithaca, N. Y.; University of Pennsylvania, Philadelphia, Pa.; Union Theological Seminary, Richmond, Va.; State Normal School, Cheney, Wash.; Vanderbilt University, Nashville, Ten.; St. Stephen's College, Annandale, N. Y.; North Carolina College of Agriculture and Mechanical Arts, West Raleigh, N. C.; Lawrenceville School, Lawrenceville, N. J.; Pomona College, Claremont, Cal.

"GEM" AUTOMATIC SUCTION VENTILATOR

Pat. Appl'd For.

A Powerful Suction Ventilator at Moderate Prices.

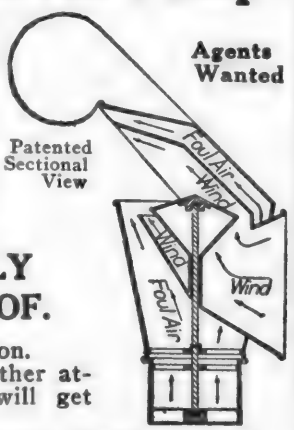
The most scientifically constructed stationary ventilator on the market. Will give Positive Ventilation under all Wind Conditions. There is always an Upward Suction; a Down Draft is impossible.

POSITIVE VENTILATION

American Standard Automatic Air Pump

Having a Special NO-DOWN-DRAFT feature, it insures a steady upward pull at all times.

Agents Wanted



ABSOLUTELY STORMPROOF.

Needs no attention.
Has no fans or other attachments that will get out of order.
Will give an average displacement at the rate of over 1000 linear feet per minute.

Specified by the New York and Massachusetts Boards of Education.

CENTURY VENTILATING CO., 430 East 23d Street, New York

Photograph in Basement of Cincinnati General Hospital

Sturtevant Apparatus in a Hospital

REG. U. S. PAT. OFF.

There are 33 motor driven Sturtevant fans in the New General Hospital in Cincinnati with combined air capacity of more than a quarter of a million cubic feet. They vary in size from Sturtevant Ready-To-Run Portable Ventilating Sets, delivering 500 CFM, to No. 8 Multivane Fans delivering 13,000 CFM. A Sturtevant Ready-To-Run Set is shown below.

The fans are direct-connected to Sturtevant direct current electric motors. The largest motor is of nominal size 10 HP.

Our engineers will be glad to co-operate with Heating and Ventilating engineers and to submit plans and specifications. Our Air Washer Department is prepared to handle all problems in air conditioning.

B. F. Sturtevant Company

Hyde Park **Boston, Mass.**

AND ALL PRINCIPAL CITIES OF THE WORLD

Bishop-Babcock-Becker Co., Cleveland, O., announces the appointment of George H. T. Scribner as the company's special representative for the states of Washington and Oregon. The company's products include the Reliable line of vacuum and vacu-vapor heating equipment, and Eureka water pumps and systems, which Mr. Scribner will handle throughout Washington and Oregon.

National Radiator Co., Johnstown, Pa., has appointed W. E. Tinker as manager of its Philadelphia office, at Juniper and Arch Streets. Mr. Tinker was formerly treasurer of the Haynes-Thompson Co., wholesalers of heating and plumbing supplies. He will retain his holdings in that company.

The H. W. Johns-Manville Co., New York, announces the removal of its Chicago offices to the new building at Michigan Avenue and 18th Street, which the company will occupy. The main floor is divided up into sales showrooms for the many asbestos and other products handled by this company, and will include a well-equipped automobile service station. The executive and general offices are located on the second floor.

Business Chances.

Washington, D. C.—Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, for the following named work:

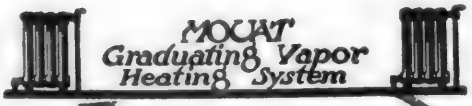
Until October 19, 1915, for the construction complete, including mechanical equipment, etc., of the U. S. Post Office at Norton, Va. Two stories and basement, 4,000 sq. ft. ground area.

Until October 27, 1915, for the construction complete, including mechanical equipment, etc., of the U. S. Post Office at Monongahela, Pa. One story and basement, 5,000 sq. ft. ground area.

Until October 27, 1915, for the construction complete, including mechanical equipment, etc., of the U. S. Post Office at Newcastle, Ind.

Until October 30, 1915, for the construction complete, including mechanical equipment, of the U. S. Post Office at Seymour, Ind.

Until Nov. 1, 1915, for the construction complete, including mechanical equipment, of the U. S. Post Office at Merrill, Wis.



Offer Your Trade Advantages They Cannot Get Elsewhere

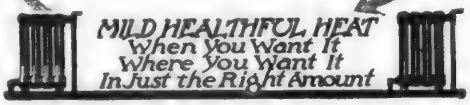
When you go out to sell a Mouat Vapor Heating System, you can offer your customers not only the highest quality equipment, but a number of most desirable advantages that cannot be obtained in any other heating system.

Heat when it is wanted, where it is wanted, and in just the right amount—independent heat regulation in each room—expense stopped when radiator is shut off—these are some of those advantages.

You know what it means to offer your customers something they want that they cannot get elsewhere.

Write today for Booklet.

THE MOUAT-SQUIRES CO.
1244 W. 4th Street
CLEVELAND, O.

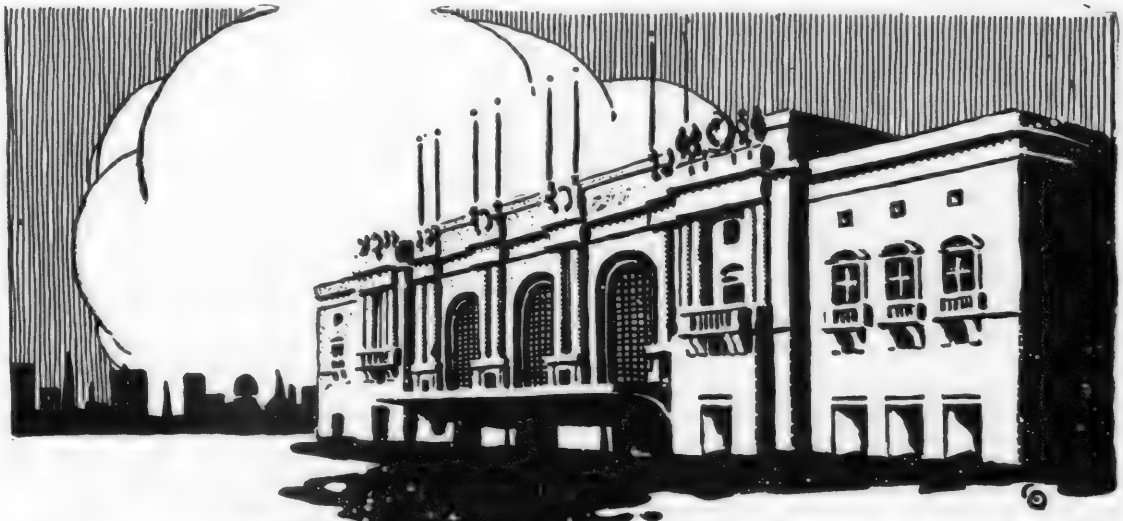


Humidity at Low Cost
is obtained with the
SĀVŌ Air Moistener

Can be placed on the back of any radiator, out of sight and will supply the desired amount of moisture to any steam or hot water heated room. Especially adapted for houses, offices, schools and hospitals.

Specify them on your next job and save the cost of an expensive humidifying system.
Three sizes, $2.00, $1.75 and $1.00. Write for free illustrated booklet.

SAVO MANUFACTURING CO., 39 South La Salle St., Chicago, Ill.



San Francisco's $2,000,000 Auditorium is equipped with a

"Sirocco"
TRADE MARK.

Heating and Ventilating System—

Architects and Engineers specify "Sirocco" Systems for all kinds of buildings with an assurance that they will do their work in the most economical way possible.

San Francisco's magnificent auditorium was built to be a permanent monument to the city's progress—so heating and ventilating equipment which would give long and continued good service was selected, and that was "Sirocco."

"Sirocco" Service, a monthly publication issued by us, will be gladly sent regularly to you upon request.

AMERICAN BLOWER COMPANY

DETROIT, MICHIGAN, U.S.A.

BRANCH OFFICES

New York—141 Broadway
Rochester—Insurance Bldg.
Philadelphia—605 Hale Bldg.
Pittsburgh—Empire Bldg.
Chicago—Marquette Bldg.
St. Louis—Title Guaranty Bldg.
Atlanta—Empire Bldg.
Kansas City—R. A. Long Bldg.
Seattle—538 Central Bldg.
San Francisco—667 Mission St.
Dallas—Southwestern Life Ins. Bldg.
Los Angeles—921 Hollingsworth Bldg.
Indianapolis—1462 Lemcke Bldg.
Boston—120 Milk St.
Columbus, O.—810 Harrison Bldg.

Canadian Sirocco Company, Ltd., Windsor, Ont., Manufacturers for Canada.

Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*

Two stories and basement, 5,244 sq. ft. ground area.

Until Nov. 5, 1915, for the construction complete, including mechanical equipment, of the new U. S. Post Office at New Braunfels, Tex. One story and basement, 4,300 sq. ft. ground area.

Until Nov. 6, 1915, for the construction complete, including mechanical equipment, of the new U. S. Post Office at East Pittsburgh, Pa.

Until Nov. 8, 1915, for the construction complete, including mechanical equipment, of the U. S. Post Office at Sidney, O. Two stories and basement, 4,925 sq. ft. ground area.

Until Nov. 10, 1915, for the construction complete, including mechanical equipment, of the U. S. Post Office at Van Wert, O. Two stories and basement, 4,800 sq. ft. ground area.

New Firms and Business Changes.

Lane & Co., heating and plumbing contractors, has been established at Houston, Texas, by D. O. Lane, formerly of Hannibal, Mo., and his two sons, George W. and Dudley J. Lane.

Hub Plumbing & Heating Co., Boston, Mass., a partnership composed of Henry F. Bimbedil and James H. Butler, has been dissolved. The business will be conducted under the same name by Mr. Bimbedil at 4282 Washington Street.

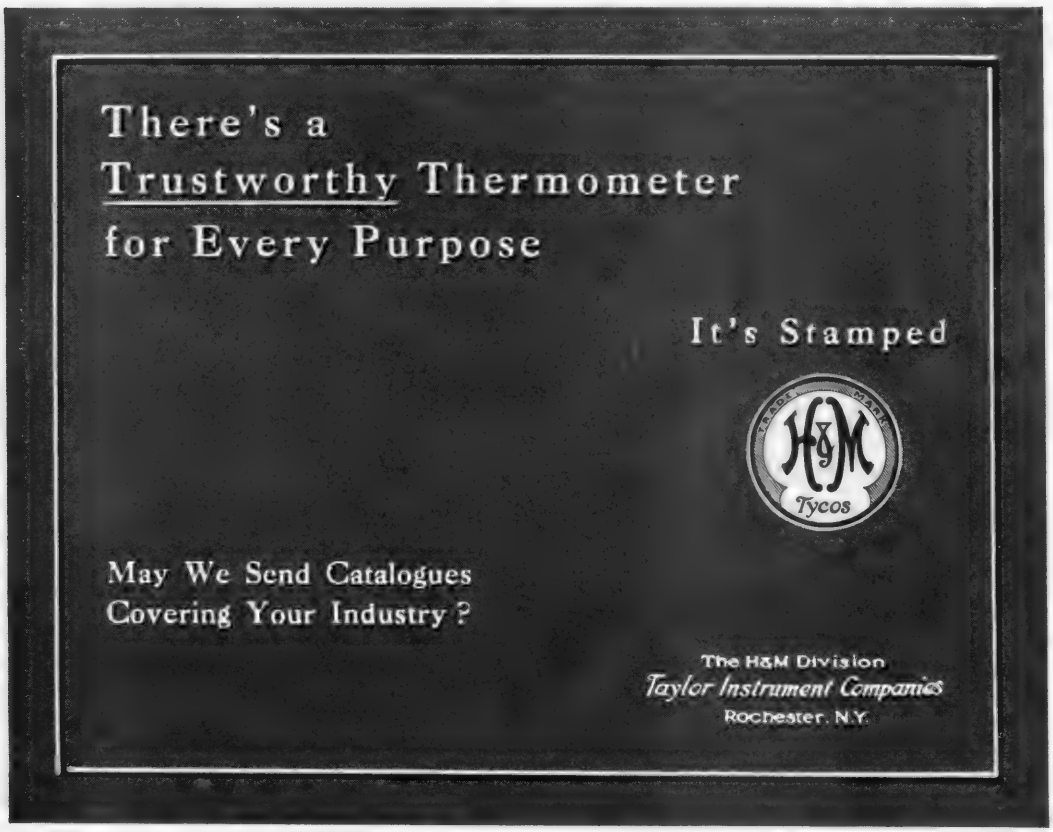
Olmsted & Kelly, Galena, Ill., is a new heating and plumbing firm composed of Charles H. Olmsted and John J. Kelly.

Northern Plumbing & Heating Co., Eveleth, Minn., together with the company's establishment at Biwabik, has been sold to D. A. Murray and Harvey Pare of Eveleth. The principals of the company up to the present are T. F. Lynch,. who is interested in Cuyuna mining properties and in gas franchises in Eveleth, Hibbing, Chisholm, Gilbert and Biwabik, and J. S. Cherne, of Virginia.

Huffman Plumbing & Heating Co., Columbus, is the changed name of the Huffman-Conklin Co. In the reorganization the new officers are: President, A. S. W. Huffman; vice-president, A. D. Wolfe; secretary and treasurer, C. C. Zurhorst. The company's offices are at 661 North High Street, Columbus.

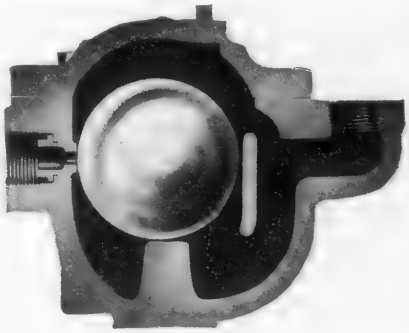
New Incorporations.

Prescott-Cutler Co., Spencer, Mass., capital $40,000, to carry on a general heating, plumbing and jobbing business. President, Edward P. Cutler, of Spencer; treasurer,



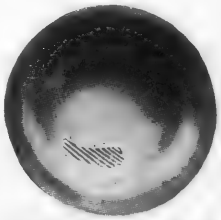
JOHNS-MANVILLE SERVICE

The Johns-Manville Steam Trap



A Three Piece Steam Trap with one working part—"A Ball that's all"

The Cover



The Floating Ball

The Body

A steam trap that cannot air bind, because, as air is heavier than steam and lighter than water, it forms a film on the surface of the water and is continually discharged with the water because the water is on the same level as the discharge orifice.

The condensate enters the trap through the inlet and there meets the baffle wall, where steam, water and all gases are separated.

The seamless ball is held against the outlet orifice by steam pressure.

As the water increases in the trap it rolls the ball away from the outlet orifice allowing the water and all gases to escape with it.

This trap will discharge water at any back pressure less than the steam pressure at the trap.

Made in various sizes and for all conditions and pressures, including partial vacuum.

H. W. JOHNS-MANVILLE COMPANY

Akron	Buffalo	Dayton	Houston	Milwaukee	Philadelphia	San Francisco
Albany	Chicago	Denver	Indianapolis	Minneapolis	Pittsburgh	Seattle
Atlanta	Cincinnati	Detroit	Kansas City	Newark	Portland	Syracuse
Baltimore	Cleveland	Duluth	Los Angeles	New Orleans	Rochester	Toledo
Birmingham	Columbus	Galveston	Louisville	New York	St. Louis	Washington
Boston	Dallas	Houston	Memphis	Omaha	St. Paul	Wilkes-Barre
					Salt Lake City	Youngstown

THE CANADIAN H. W. JOHNS-MANVILLE CO., LIMITED, Toronto, Winnipeg, Montreal, Vancouver

Harry R. Prescott, of Spencer; secretary, Ella F. Seward, of Worcester.

Johnson Heating Co., Detroit, Mich., capital $10,000, to manufacture heating and plumbing supplies. The stockholders include William K. Johnson, Thomas G. Barbas and Margaret Johnson.

Pittsburg-Steward Heater & Filter Co., S Louis, Mo., capital $15,000, to manufacture, sell and deal in water heaters, etc. The stockholders include Clarence H. King, William Stewart, University City, Mo.

Universal Heater Co., Cleveland, O., capital $25,000. Incorporators: R. W.

Type for use on radiator

THE STEAMO AIR MOISTENER

For Steam Heating Systems

The cheapest, best and most practical means for humidifying apartments, residences, schools, offices, factories, etc.

The Steamo discharges vapor absolutely without noise or dripping of water.
An attractive nickel plated device.
Readily attached.
Easily regulated.
Now being specified in the best work.
Made in a variety of sizes for all purposes.

There is now no reason why all heating plants should not be designed to embrace the great advantage of humidity, or existing steam plants amplified.

Descriptive matter and prices on request.

THE AIR MOISTENER CO.
28 North Market Street, Chicago, Illinois

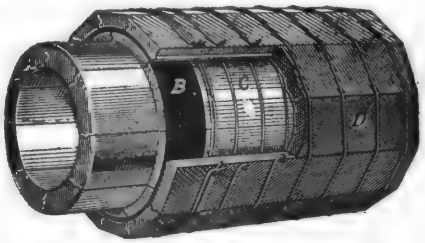
¼ H. P. Equipment

Spencer Turbine Vacuum Cleaners

are manufactured in sizes from ¾ H. P. to 40 H. P.

Send for catalogue

SPENCER TURBINE CLEANER COMPANY
HARTFORD, CT.



A—Inner Shell, 2 inches thick.
B—Asphaltum Packing.
C—Dead Air Space.
D—Outer Shell, 1 inch thick.

Cover Your Steam Pipes

WITH WYCKOFF'S IMPROVED

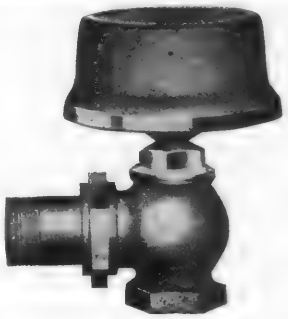
CYPRESS COVERING

Made of Gulf Cypress, the wood eternal

Not affected by wet and dry conditions common to steampipe trenches. Will not rot. Lasts twice as long as Pine Casing. Absolutely water and steam tight. Each shell is wound with heavy galvanized wire. Coated all over with the best known preservative—Hydrolene B.

Let us answer your questions and tell you all about it. Booklet on request.

A. WYCKOFF & SON COMPANY
ELMIRA . . N. Y.
Chicago, Ill., 551 West 14th Place



Johnson Sylphon Valve

in which the RUBBER diaphragm is replaced by the METAL SYLPHON BELLOWS, which will not vulcanize, crack and leak, reducing the repairs to a minimum and increasing the efficiency and desirability of the Johnson System of Automatic Temperature Regulation.

Write for Booklet.

Johnson Service Company

MILWAUKEE, WISCONSIN

NOTICE—We are the owners of Patent No. 924,235 relating to the automatic control oi humidity. Infringers and unlicensed users will be prosecuted.

Small Electric Blower Extremely Popular

Like the large size "Conoidal" Fan, the success of the

Buffalo "Baby Conoidal" Ventilating Sets

has been most gratifying to us. This fan furnishes a very large volume of air at an extremely low pressure, the efficiency of the fan exceeding that of any other multiblade type. It is unexcelled for **Drying Purposes** and for supplying fresh, cool air to **Offices, Private Homes, Telephone Booths, Staterooms, Banquet Rooms, Railroad Cars, Kitchens, Laboratories, etc., etc.** Equally good results are obtained where it is desired to exhaust smoke, fumes and hot air.

Its hum is inaudible.

Bulletin 182-E-36 gives complete information.

BUFFALO FORGE COMPANY, Buffalo, N. Y.

Daykin, John D. Gilchrist, R. C. Boville, Sadie X. Daykin and William Gilchrist.

Huffman Plumbing and Heating Co., Columbus, O., capital $10,000. Incorporators: A. S. W. Huffman, Arthur B. Wolfe, Frank J. Hillay and others.

New England Radiator Co., Boston, Mass., capital $25,000. Incorporators: William W. Phillips, Marion I. Kellogg and Clarence G. Kellogg.

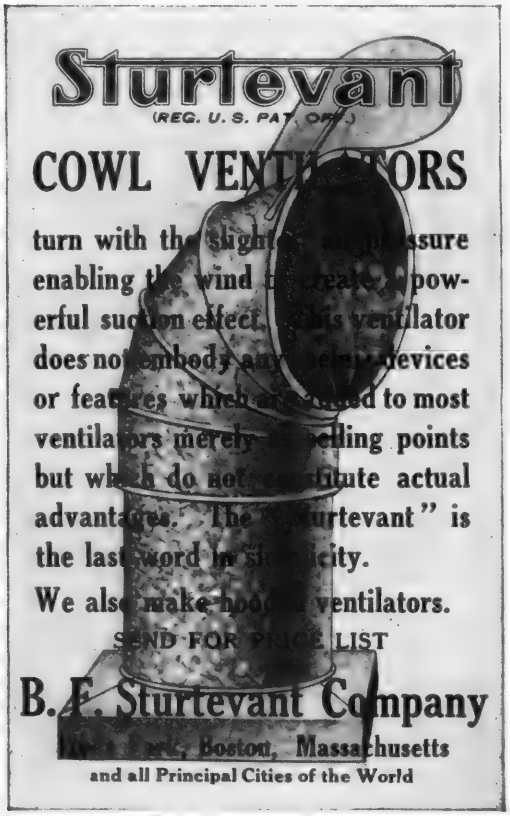
National Capital Mfg. Co., New York, capital $100,000, to manufacture window blinds, window shades, window ventilators, awnings, etc.

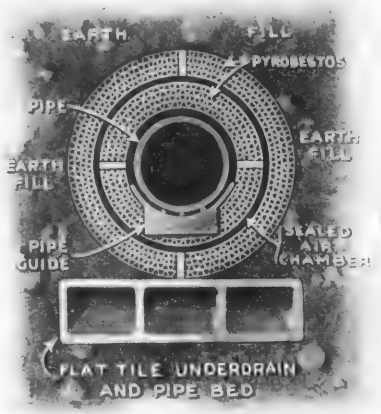
Hasseidahl-Lane Co., Detroit, Mich., capital $6,500, to manufacture and deal in heating and plumbing supplies. The stockholders include Henry N. Haisseidahl, Charles A. Lane and Emil E. Rupp.

Springfield Plumbing & Heating Co., Springfield, Mass. Capital, $30,000.

Lindemuth Engineering Co., New York, capital $25,000, to erect and install heating and ventilating systems.

Scofield Heater Co., Bloomington, Ill., capital $25,000, to manufacture and sell heating devices. Incorporators: Floyd Scofield, H. A. Cheney, A. R. Moore, J. K. Esh and W. G. Moore, all of Carlock, Ill. Mr. Scofield is the inventor of the heating


Sturtevant
(REG. U. S. PAT. OFF.)
COWL VENTILATORS
turn with the slightest pressure
enabling the wind to create a powerful suction effect. This ventilator
does not embody any of the devices
or features which are claimed to most
ventilators merely as selling points
but which do not constitute actual
advantages. The "Sturtevant" is
the last word in simplicity.
We also make hood ventilators.
SEND FOR PRICE LIST
B. F. Sturtevant Company
Boston, Massachusetts
and all Principal Cities of the World

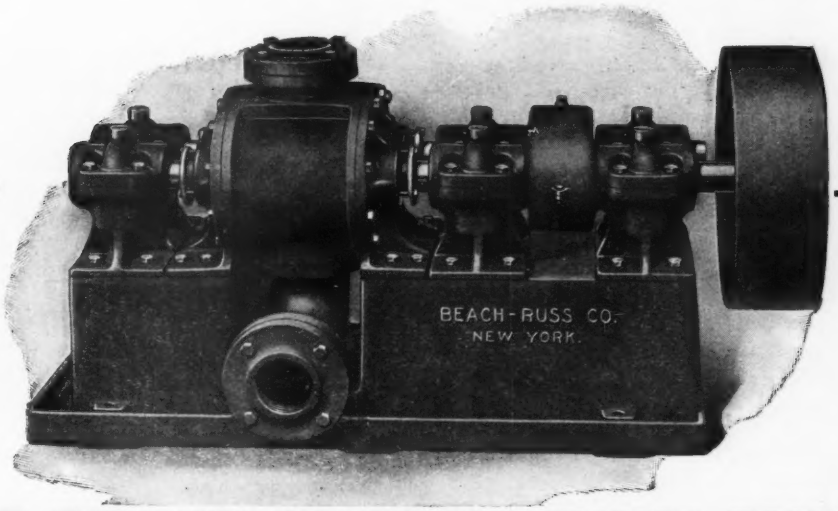


Pyro-Bestos Underground Pipe Insulation

For piping from central heating or power station to detached buildings of Universities, Asylums, Hospitals, Factories, etc. Also as underground Pipe Conduit for heating private Auto garages direct from House heating system. Lasts longer than Wood; in fact indefinitely. Easily applied and of reasonable cost. Is water repellant,—does not absorb moisture like Magnesia, Infusorial Earth or the loose filling in Tile Conduit systems, all of which materials acting like a wet sponge held against the piping soon rust holes in the piping. We have cases on record where Insulations of the absorbent type have totally destroyed the piping in five years and less after installation, making it necessary to go all over again with the cost of digging trenches, new piping and new Insulation. No material of an absorbent nature should be placed around underground piping. Test all underground Insulations offered you by placing a fragment in a glass of water. If it absorbs water, don't use it.

National Air Cell Covering Co.

210-220 Van Brunt St., Brooklyn, N. Y.



THE BEACH-RUSS VACUUM PUMPS

PATENTED

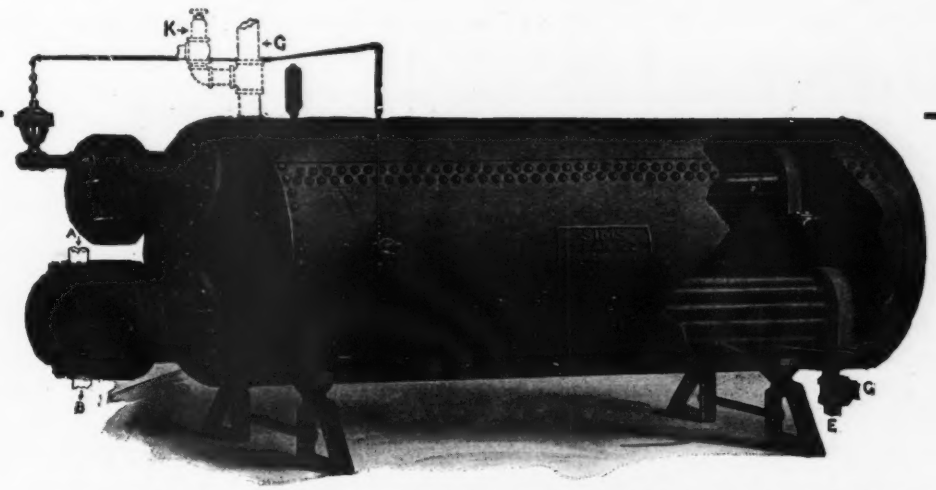
For Return Line Vacuum Heating Systems

This is the Vacuum pump you hear so much about. Specified by leading consulting engineers. We know it's the best, why not try it?

We also manufacture Air Line Vacuum Pumps for the Paul System of Air Line Vacuum Heating and also make Pressure Blowers and Dry Vacuum Pumps.

BEACH-RUSS COMPANY, 220 Broadway, New York

Factories: 182 West St. and 55-59 Greene St., Brooklyn, N. Y.



WHEN THE HOT WATER DEMAND RUNS HIGH

Our large experience in manufacturing heaters for laundries has developed the fact that there is not always enough exhaust steam to heat all the water to the temperature required. This is always the case with a wet-wash laundry. For a high hot water demand use the

SIMS CLEAN E-Z HEATER, TYPE D.

This heater is supplied with two sets of straight, seamless drawn brass tubes, the lower for exhaust steam, located in the coolest water. The upper set of tubes is for live steam direct from the boiler, controlled by a thermostat.

Our Bulletin HL-2 gives full particulars of Sims Heaters for laundries, hotels, hospitals and other service. Consultation free. All work guaranteed.

THE SIMS COMPANY **18th Street, Erie, Pa.**

system that will be sold by the company, which is protected by patents. The apparatus consists of an arrangement whereby a gas heater may be attached to any individual radiator and in this manner heat may be supplied to different rooms as desired. A model of the system has been placed on exhibition in the offices of J. T. McGrath & Son, in Bloomington. The heater will be manufactured outside of the city at first but the plans are to manufacture it in Bloomington as soon as suitable quarters are secured.

Hygienic Heating Co., Nashville, Tenn., capital $25,000, to manufacture a patented heater which draws air from the outside, heats it and discharges it into the room. Incorporators: J. B. Chapman, H. L. Williams and B. T. Beesley.

Universal Heater Co., Cleveland, O., capital $25,000, to manufacture heating apparatus. One of the principal stockholders is R. W. Daykin.

Contractors' & Plumbers' Supply Corporation, Richmond, Va., capital $25,000. President, T. A. Somers; vice-president, O. B. Lovell; secretary and treasurer, E. W. Evans.

Eastern Plumbing Supply Co., Hartford, Conn., capital $25,000. Incorporators: Barney Marcus, R. Meister and Merrill A. Mills.

Automatic Gas Steam Radiator Co., Pittsburgh, Pa., capital $5,000. Incorporators: Thomas C. Hughes, F. M. Cain and T. J. Easterbrook.

Standard Plumbing & Heating Co., Portland, Me., capital $10,000. President, William D. McCalmon; treasurer, David Carvel; clerk, Max L. Pinansky. Directors: William D. McCalmon, David Carvel and Abraham Lourie.

Wigman Co., Sioux City, Ia., capital $30,000, to conduct a wholesale heating and plumbing supply business. Incorporators: W. M. Wigman and M. Hoffman.

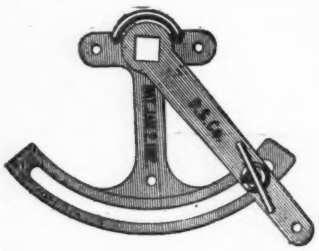
Contracts Awarded.

B. MacKenzie, Greensboro, N. C., central heating plant for the Presbyterian Orphans' Home at Barium Springs, N. C. The contract amounts to $11,500.

McCreedy Plumbing & Heating Co., Rochester, Mich., heating and ventilating the Orion School at Orion.

L. W. Rosen Heating Co., Madison, Wis., heating and ventilating new Lincoln School for $10,381, less the price of the boiler, which will amount to about $900.

Wichita Heating & Plumbing Co., Wich-



Parker's Damper Quadrant

CONCEDED to be the most efficient device for regulating dampers and deflectors in ducts, smoke pipes, etc. Specify it for your next job.

Sample, literature, etc., on request

Parker Supply Company

Makers of Expansion Bolts, Screw Anchors, Malleable and Wrought Iron Products

523 W. 45th St., New York

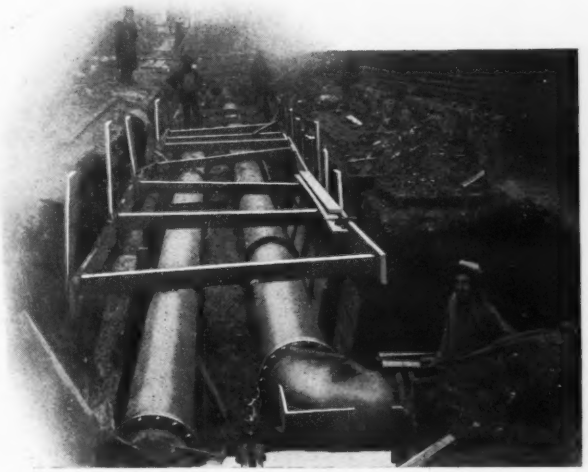
(*Opportunity Talks No. 7*)

How Central Station Heating Supplements The Lighting and Power Plant

It is a well-recognized fact that a highly successful manufacturing plant in any line must be one from which the very last cent is obtained, not only for the primary product itself, but for the utilization of every possible by-product as well. District steam heating is a means of utilizing a by-product (exhaust steam) of the central station.

It Can Be Made Profitable In Your Locality

If you already have an electric light plant, a low pressure steam heating plant can be installed along the lines that have been so well tried out during the last 38 years. In the case of an old electric plant which has reached its limit of efficiency, and yet is unsatisfactory in comparison with modern equipment, the investment necessary for a district steam heating system would be lower than that necessary for modern equipment and the results will exceed those of a thoroughly modern plant without a district heating system.



Twin Feeders from Central Heating Plant in large city in Missouri

You Can Make Your Plant Pay Either Way

Send for our Bulletin No. H-117, which will tell you how to develop a steam heating system in connection with your electric light plant.

AMERICAN DISTRICT STEAM COMPANY

General Offices and Works: NORTH TONAWANDA, N. Y.

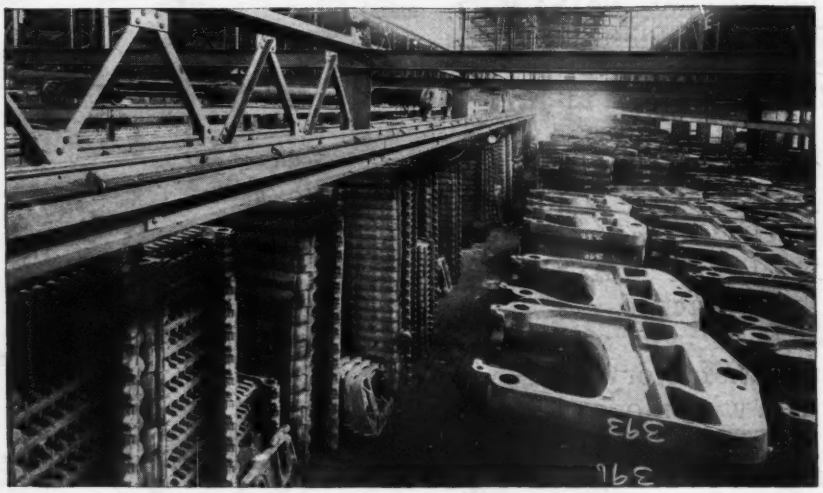
NEW YORK
West Street Bldg.

CHICAGO, ILL.
First National Bank Bldg.

SEATTLE, WASH.
Hoge Building

Prepared to serve

This is the very height of the heating season. Prompt deliveries mean money to you now and we are prepared to deliver. We have made the maximum of all styles and heights of AMERICAN Radiators and all types and sizes of IDEAL Boilers. These stocks have been divided and distributed to our many warehouses. They are now readily accessible to you.



How an IDEAL Boiler warehouse looks today

Smokehoods and bases of IDEAL ARCO Boilers are assembled and crated at our factories. You have only to set them in place.

All sectional parts of IDEAL Boilers are numbered. They are built to jig measurements. They are interchangeable. They fit.

Even if you have forgotten to order, or been held up by strikes or bad weather, you need not worry about delayed shipments. We are prepared for the eleventh hour demand.

AMERICAN RADIATOR COMPANY

Public Showrooms at Chicago, New York, Boston, Worcester, Providence, Philadelphia, Washington, Baltimore, Rochester, Buffalo, Pittsburgh, Cleveland, Cincinnati, Detroit, Atlanta, Birmingham, New Orleans, Indianapolis, Milwaukee, Omaha, Minneapolis, St. Paul, St. Louis, Kansas City, Denver, Seattle, Portland, Spokane, Los Angeles, San Francisco, Toronto, Brantford (Ont.), London, Paris, Brussels, Berlin, Cologne, Milan, Vienna